Chesapeake Bay TMDL
Virginia Phase III WIP

Northern Virginia
Load Allocation Area

Results of the Stakeholder Engagement Process

Northern Virginia Regional Commission

December 2018

Disclaimer

The Best Management Practices Input deck developed by the Northern Virginia Regional Commission for the Virginia Department of Environmental Quality Local Area Planning effort solely represents a theoretical implementation of BMPs by 2025, strictly for the unregulated developed (non-MS4), natural, and septic sectors, based upon information supplied to the PDC by the DEQ as of June 2018. This theoretical scenario is just one of hundreds of possibilities that may, or may not, occur between now and 2025 in the unregulated developed (non-MS4), natural, and septic sectors. Furthermore, this submittal does not represent any commitment, by any of the local governments of northern Virginia, to implement or fund the BMP's, Programmatic Actions or Strategies.

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Introduction

In support of the Chesapeake Bay Phase III Watershed Implementation Planning (WIP) efforts, the Virginia Department of Environmental Quality (DEQ), in cooperation with the Chesapeake Bay Program Partnership and other state and federal partners, made grant funds available to Virginia's Planning District Commissions (PDCs) to develop a local stakeholder development process.

The PDCs, as authorized in the Code of Virginia (§15.2-4207), encourage and facilitate local government cooperation and state-local cooperation in addressing on a regional basis, problems of greater than local significance, specifically in the functional area of environmental management. The Virginia PDCs are accustomed to undertaking technical assistance grant projects and regularly providing coordination with local government representatives. Their work typically focuses on data and information exchanges between local, state and federal partners and analyses of resource management issues resulting in an informational end product such as reports, maps, data inputs and outreach tools. PDCs also have specifically provided process facilitation, data scenario and strategy development in Virginia's previous processes of Chesapeake Bay WIP development.

The intent of this project initiative was for each PDC covering Chesapeake Bay watershed localities to convene locality and regional officials, staff and stakeholders to provide input and recommendations for meeting Local Area Planning Goals (LAPGs) in accordance with the DEQ-provided "Outline for Local Area Planning Goal Initiative".

Local area planning goals were defined as pounds of nitrogen and phosphorous to be reduced. DEQ developed urban, forest and septic local area planning goals and an associated template BMP input deck that meet those goals at the PDC boundary. These planning goals incorporated tree canopy and any forestlands not included with Virginia Soil and Water Conservation District boundaries (SWCD). Agricultural and forest LAPGs and input decks were provided to Soil and Water Conservation District Areas for a parallel planning effort. The template BMP input decks contained mixes of nonpoint source pollution controls that meet the local area planning goals.

Template BMP input decks were based on input decks developed during the WIP II process to initiate discussions. The template BMP input decks were then adjusted by the PDCs to reflect implementation WIP III goals. Template BMP input decks could then be provided as a shared

Chesapeake Assessment Scenario Training (CAST) scenario or as a preformatted Excel spreadsheet and are the primary tools to determine if local area planning goals are met.

As DEQ did not assign LAPGs to areas and facilities covered by a Permit, this effort did not address planning or implementation of BMP in the regulated areas within the PDC. Reductions achieved through permitting requirements (e.g., waste load allocations,) will be included as separate strategies in the Phase III WIP and DEQ will be responsible for ensuring that such reductions are achieved.

The PDCs have been informed that DEQ will incorporate the BMPs selected by the local and regional partners into the statewide input deck that DEQ will build as part of the Phase III WIP development process. DEQ will also incorporate submitted BMP implementation strategies into the Phase III WIP. DEQ will also append all PDC reports to the draft and final Phase III WIP.

In support of Virginia's efforts, NVRC developed a number of spreadsheets, statistics and presentation information, derived from CAST, for the Deputy Secretary of Natural Resources on the current status of the Load Allocation Sector in Virginia.

The information clearly shows that 70% of the developed acres within the Commonwealth are in the Unregulated Developed Sector and that the Unregulated Developed Sector accounts for 64 to 68% of the developed nitrogen and phosphorus loading. Reliance on just the Regulated Developed Sector to achieve the developed Phase III WIP goals will not be remotely possible.

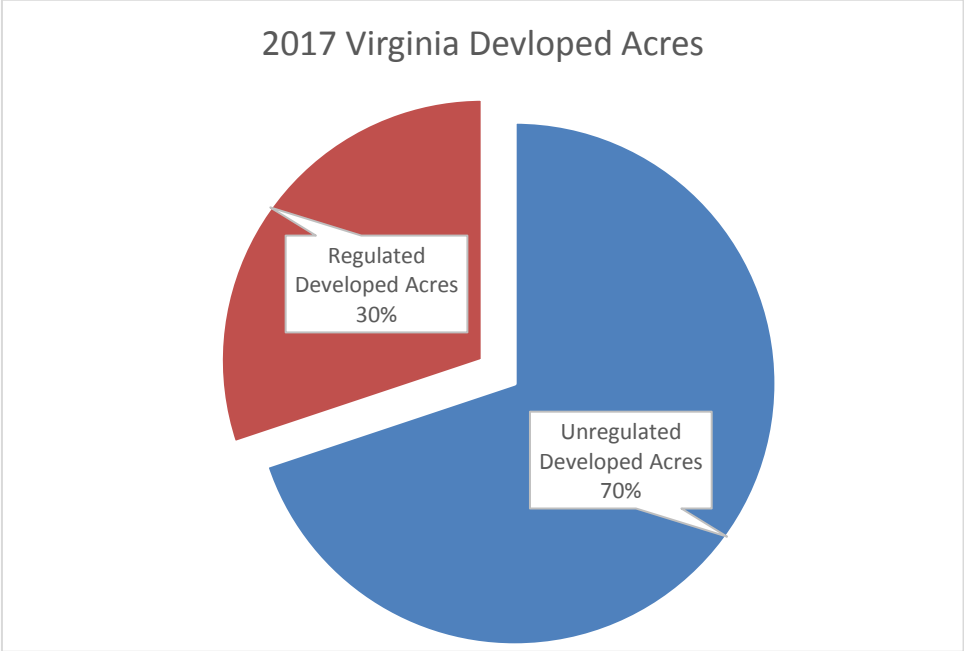

Figure 1. 2017 Virginia Developed Sector (acres)

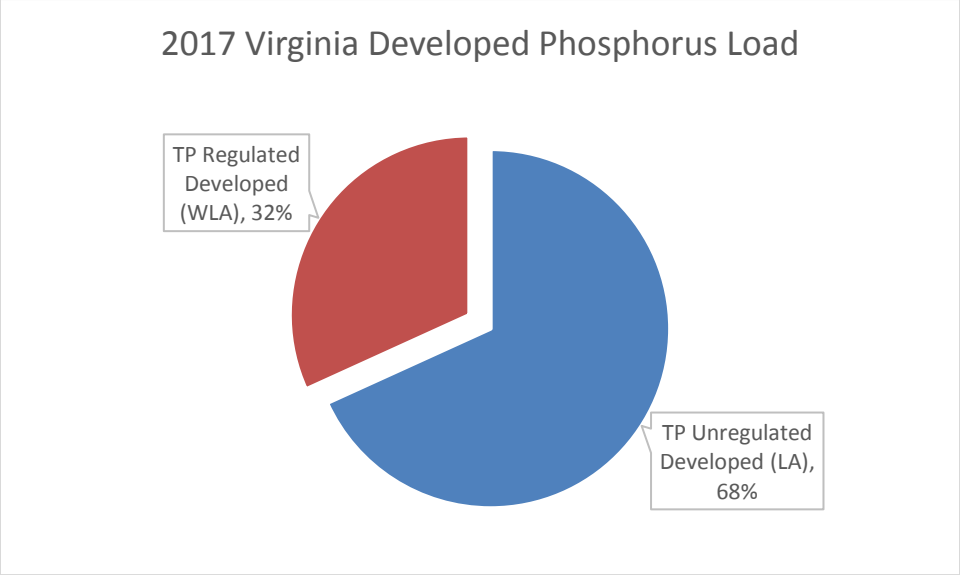

Figure 2. 2017 Virginia Developed Phosphorus Load

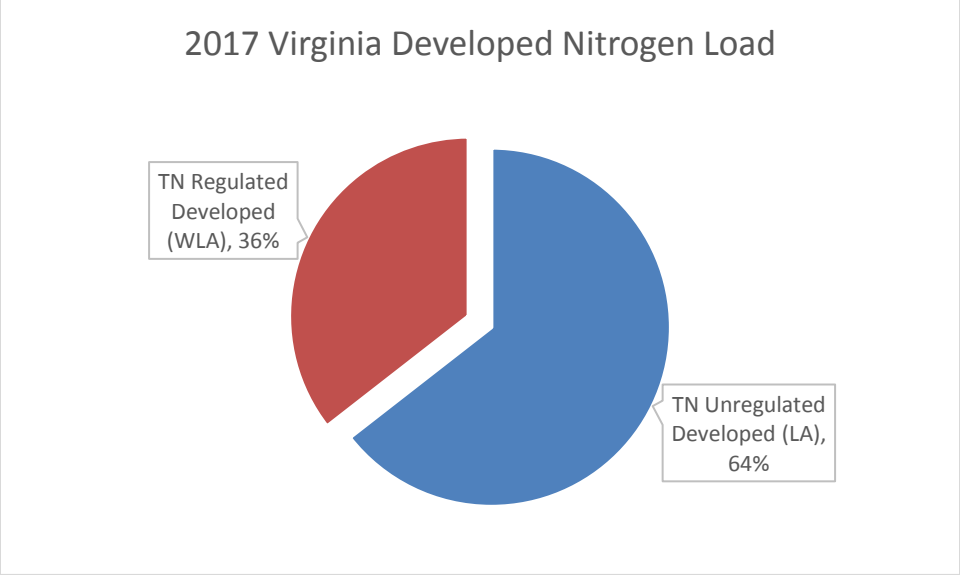

Figure 3. 2017 Virginia Developed Nitrogen Load

Study Area

The Northern Virginia Regional Commission (NVRC), otherwise known as PDC #8, is comprised of thirteen member local governments in the Northern Virginia suburbs of Washington, DC. Of

those thirteen local governments only eight are sufficiently large enough to be incorporated in CAST (Table 1.) for planning and reporting purposes.

Table 1: Northern Virginia LA Local Governments.

CAST Communities	MS4 Communities
Arlington County	Arlington County
Fairfax County	Fairfax County
Prince William County	Loudoun County
City of Alexandria	Prince William County
City of Fairfax	City of Alexandria
City of Falls Church	City of Falls Church
City of Manassas	City of Fairfax
City of Manassas Park	City of Manassas
	City of Manassas Park
	Town of Dumfries
	Town of Leesburg

The remaining local governments, incorporated Towns, and their implementation efforts are captured within the larger government boundaries. For instance, all of the efforts undertaken by the Town of Dumfries, are incorporated into the CAST numerics for Prince William County. Several of the incorporated Towns are sufficiently small enough that they are not municipal separate storm sewer system (MS4) permit holders. The individual letters of participation submitted by local governments to the NVRC can be found at the end of this document in Appendix A. While Prince William County and the City of Fairfax did not submit formal letters of participation they did participate in the Stakeholder meeting process.

Figure 4: Location Map

Stakeholder Meetings

In an attempt to develop a Stakeholder group with a broad interest across northern Virginia, contact was made to all local governments, the three local Soil and Water Conservations Districts, local health departments, various state agencies and non-governmental

environmental groups. A total of five Stakeholder meetings were held, including the joint PDC - Soil and Water Conservation District meeting (August 17th, September 21st, October 26th and November 19th). In addition to these meetings NVRC meet specifically with the Soil and Water Conservation Executive Directors for the Northern Virginia SWCD and the Prince William SWCD on November 14th. Unfortunately, due to last minute circumstance the Loudoun SWCD Director could not attend. The Stakeholder meetings were also advertised by DEQ on the Virginia Regulatory Town Hall. The individual meeting summaries can be found in Appendix B of this document.

Land Use

Individual Sector land use, with respect to the NVRC Load Allocation Boundary, can be seen in Table 2. For an area that is normally considered to be one of the most highly developed PDC's within Virginia, the Natural sector area comprises the majority of the land use at approximately 43%.

Table 2: NVRC LA Sector Land Use Summary.

	% of Total Land Use
Unregulated Developed	23%
Regulated Developed	18%
Regulated Construction	1%
CSO*	<1%
Agriculture	15%
Natural	43%

The distribution and change of the land cover between the sectors for 2009 and 2017 can be seen in Figures 5 and 6. Construction, the very top bar in both the two figures, represents less than 1% of the Land Use. Between 2009 and 2017, the Natural Sector lost some 23,000 acres of land and the Agricultural Sector lost approximately 9,000 acres. Development within the unregulated portion of northern Virginia significantly outpaced development within the regulated area, indicative of the continued development of suburban northern Virginia. Utilizing the land use projections for the Phase VI Chesapeake Bay Model, there are only 4,000 acres of projected Natural land use losses left to be developed between 2018 and 2025, a number which is clearly off based on the 2009-2017 period. **NVRC recommends that the Chesapeake Bay Program and DEQ revisit the assumptions for land use conversion with the next milestone period when the model lockdown period is lifted.**

Note: Prior to this study, the basic assumption in land use conversion has always been that there will be a significant bias towards the development of agricultural land. These assumptions were built into many planning efforts, including the development of the Virginia Phase II WIP and the underlying assumptions and calculations used to derive the Virginia 0.41 lbs P/acre Stormwater Standard. Should this development pattern hold true for the rest of the Chesapeake Bay portion of the Virginia Commonwealth, any calculation based on land use conversion should be revaluated.

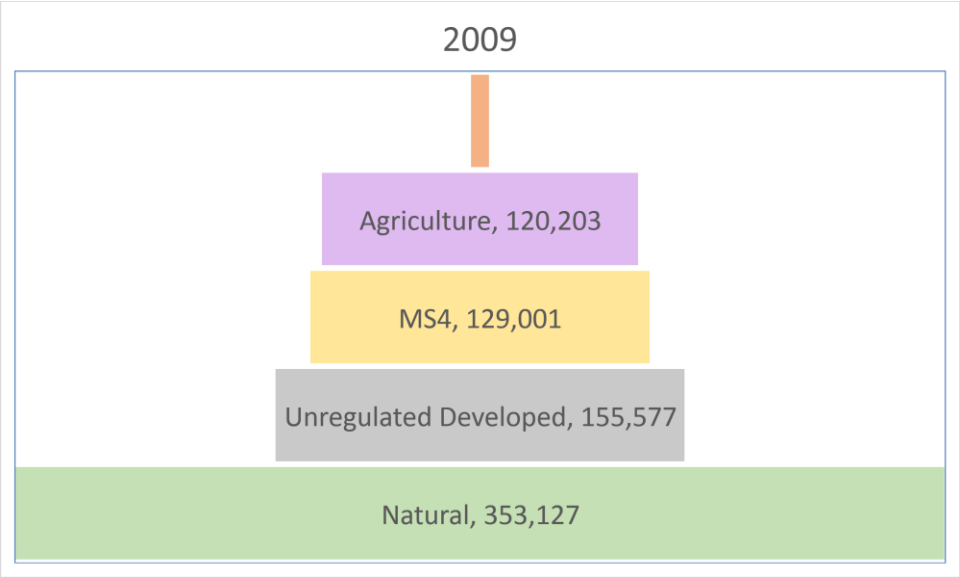

Figure 5. 2009 Sector Land Use (acres)

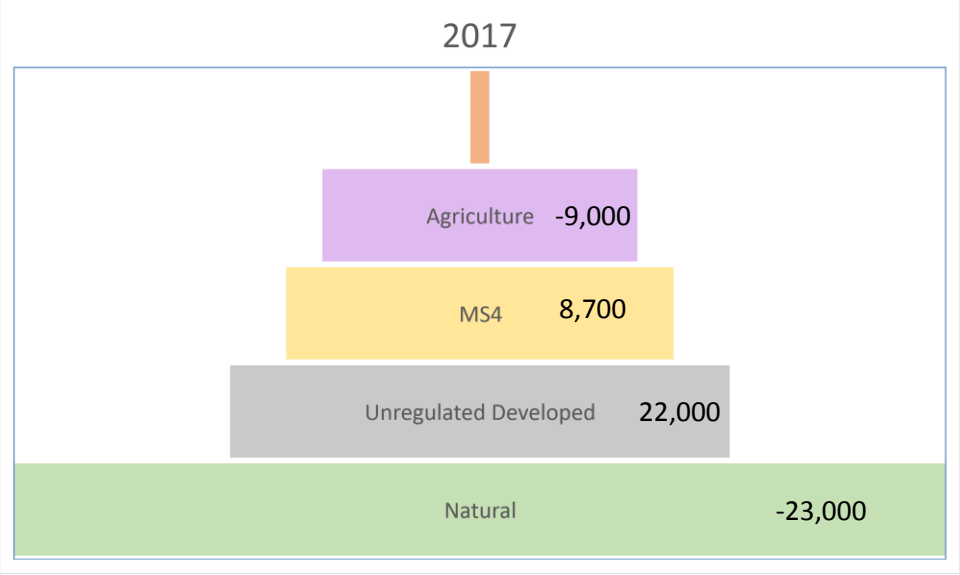

Figure 6. 2017 Sector Land Use (acres)

Amongst the individual local governments within PDC #8, Loudoun County represents the largest holder of unregulated developed land at approximately 75% followed by Prince William County at 61%, see Figure 7.

Note: NVRC identified an error in CAST baseline data for the Cities of Manassas, Manassas Park and Falls Church. The unregulated and regulated acreage totals have been flip-flopped. This will potentially have an impact on BMP crediting for the individual sectors as the model may interpret insufficient acres within the sectors. **NVRC recommends that the Chesapeake Bay Program and VA DEQ revisit the error during the next milestone period when the model lockdown period is lifted.**

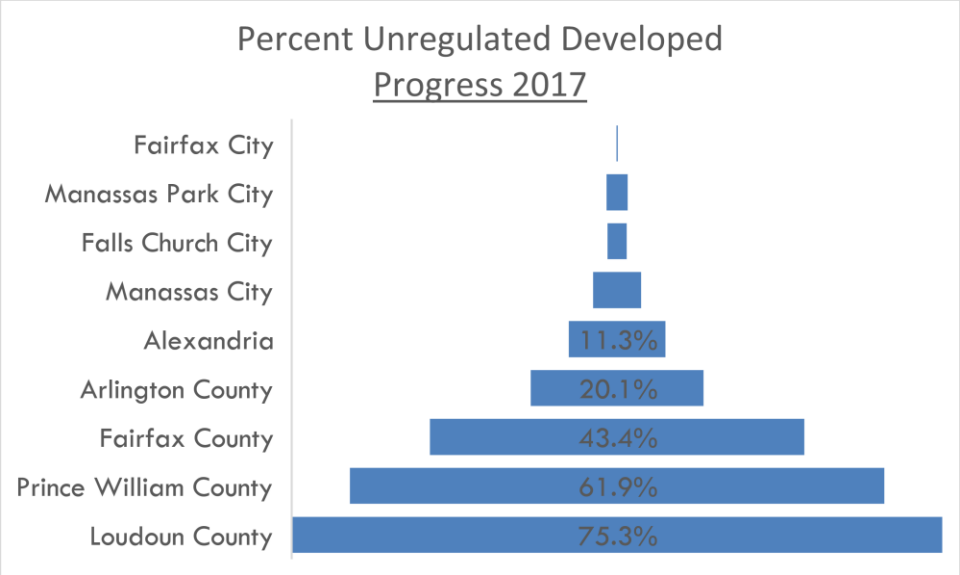

Figure 7. Percent of Unregulated Developed in LA

With respect to potential load sources within the Local Planning area, the most significant potential source is Turf Grass, see Figure 8. Surprisingly, the acreage associated with Building and Other is almost identical to that of Tree Canopy over Turf Grass. Pervious developed land greatly exceeds that of Impervious Developed land within the planning area.

Septic Data

Of all the CAST sector data, the Septic Source data was considered by the Stakeholders to be the most unreliable. For the most part, the majority of the local government representatives stated that the septic numbers up to 2017 appeared to be in order, however, the projected 2025 numbers were too high, although they had no data to back up their concerns. There were

however some clear errors. CAST indicates the presence of septic systems for the City of Manassas Park, the City of Alexandria and Arlington County. All of those jurisdictions have indicated that there are currently no known septic systems in their respective jurisdictions and the CAST data needs to adjusted.

NVRC recommends that the Chesapeake Bay Program and VA DEQ revise the septic data for the City of Manassas Park, the City of Alexandria and Arlington County during the next milestone period when the model lockdown period is lifted. NVRC also recommends that DEQ discuss the methodology that the Bay Program uses to predict septic systems out to 2025 for possible revision. Based upon discussions with other PDCs, it appears that the issue of septic data concerns are much more systemic and NVRC recommends that the state examine the tracking and reporting mechanisms in place for septic data for improvements.

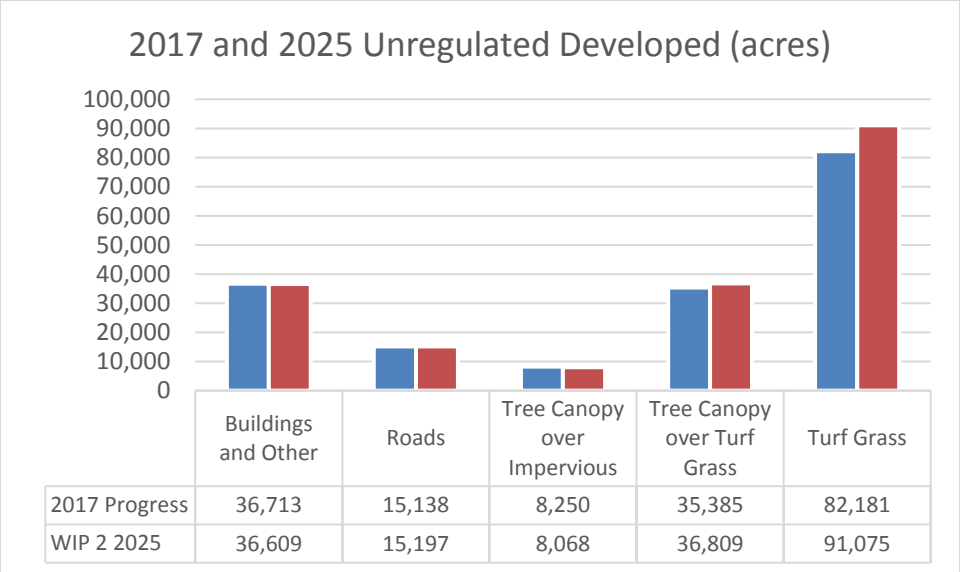

Figure 8. 2017 and 2025 Unregulated Developed Sources (Acres)

2009 to 2017 Progress Loading

Breaking down the phosphorus progress loading for the period 2009 to 2017 suggests that both the Unregulated Developed and the Regulated Developed sources have been increasing at about the same rate. As can be seen from Figure 9, phosphorus loads from the regulated developed sector have increased by about 9,000 lbs with an increase of about 9,000 acres developed. Undetectable in these numbers however are the reduction in loads associated with retrofits of older stormwater management facilities within the regulated area. The true load increase associated with the 9,000 acres is probably slightly higher. With respect to nitrogen

loads (Figure 10) there appears to be a slightly discernable difference in loading between the Unregulated Sector and the Regulated Sector. The Stakeholders speculate that this may be the result of local government MS4 Programs specifically targeting BMP restoration projects for higher nitrogen reductions for permit compliance as the removal of nitrogen in stormwater is much more difficult.

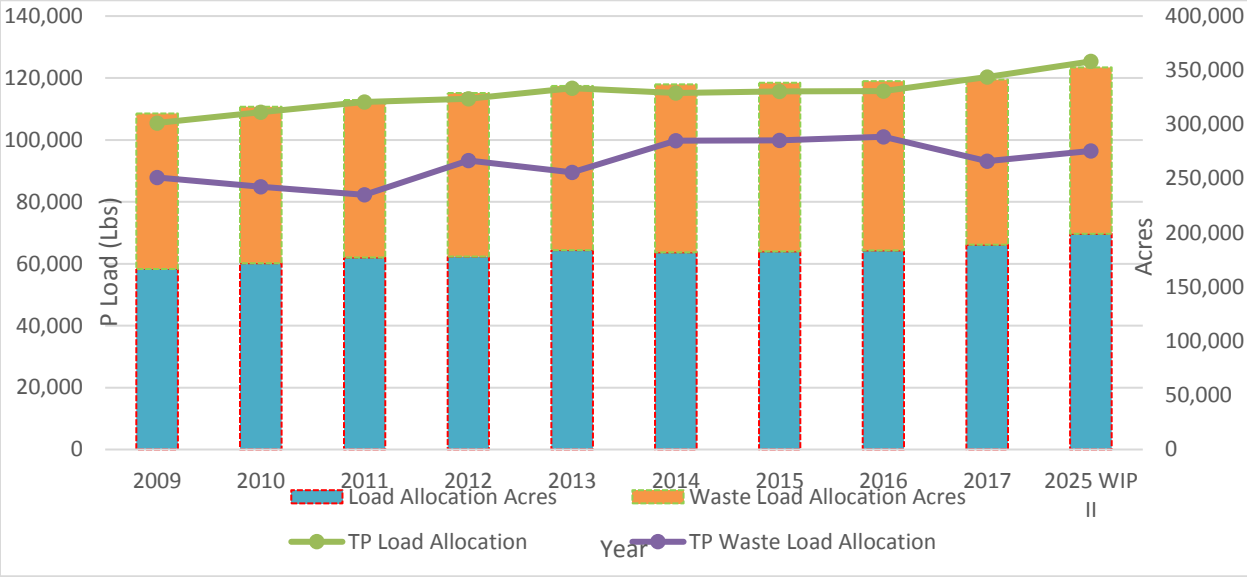

Figure 9. Phosphorus Loading Regulated and Unregulated (lbs and acres)

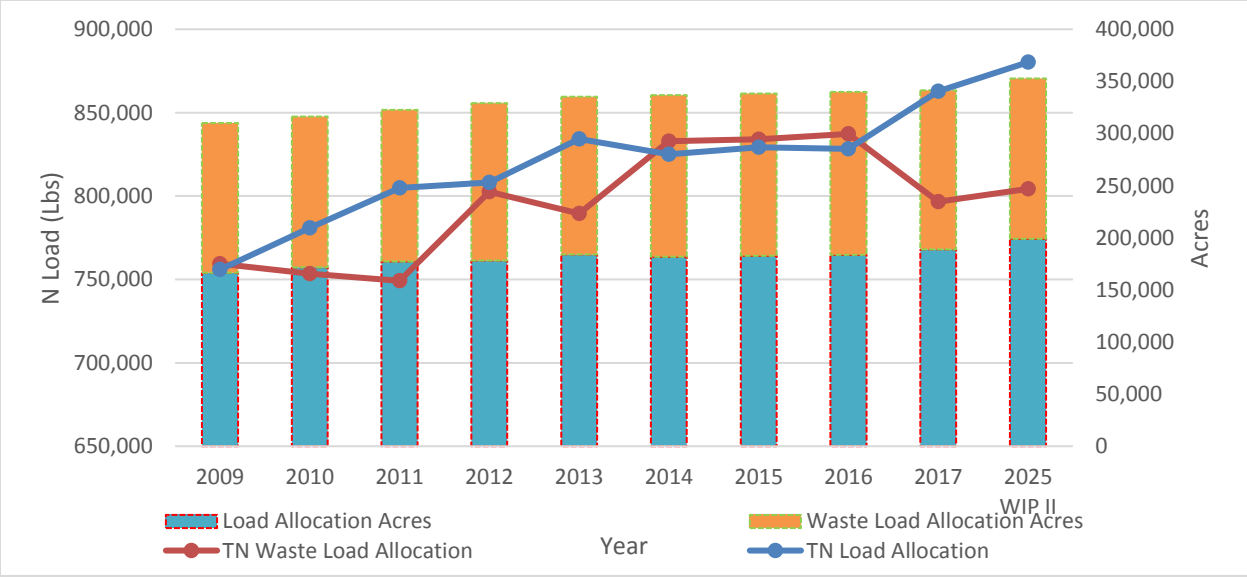

Figure 10. Nitrogen Loading Regulated and Unregulated (lbs and acres)

2017 BMP Implementation and Phase II WIP Projections

Utilizing CAST and the Template Spreadsheet provided by DEQ, NVRC examined the 2017 BMP Implementation levels and those projected for 2025 in the Phase II WIP for the local planning boundary (Table 3). Several issues are quite noticeable upon inspection:

- Lower efficiency Dry Pond BMP implementation still dominates BMP selection in contradiction to the thought process during the Phase II WIP development.
- Stakeholders considered the level of Urban Nutrient Management specified by the Phase II WIP to be unattainable.
- Local governments consider the current level of E&S Control currently being implemented to be at Level 2, not the Level 1 as specified in the Phase II WIP.
- A number of BMPs currently favored, such as the Stormwater Performance Standard, were not available during the Phase II WIP and need to be incorporated into the Phase III WIP.
- The top 5 BMPS in the Phase II WIP and the top 4 BMPs in 2017 (on a percentage basis) represent 85% of all the stormwater BMPs.
- The number of conventual denitrification septic systems is severely overestimated

BMP Warehouse

A reoccurring theme throughout the Stakeholder meetings was confusion over the role of the MS4 with the BMP Warehouse, MS4 Annual Reports and the Construction General Permit (CGP) reporting process. Although this has been discussed in many forums, several localities were still under the impression that information transmitted in the annual MS4 Report will always make its way into the BMP Warehouse. Several localities also expressed concern that even within their own governmental structures the divisions responsible for the CGP do not necessarily use the same asset management tracking systems, so the possibility exists that BMPs inventories may not be making its way into the asset management tracking systems that the MS4 divisions use. Because of these discussions Fairfax County concluded that all of their stream restoration that they have been reporting in their annual MS4 reports are not included in the CAST data. They have now entered that information into the BMP Warehouse and it should populate with the 2018 or 2019 Progress release. It also came to light as a result of these discussions that for the DEQ "Historic Data Cleanup" the City of Alexandria may have only included BMPs that were within their regulated area and may not have included BMPs in the unregulated area. The City is going to go back and examine their submittals to see if that was indeed the case**. Speaking with several other PDCs on the issue of the BMP Warehouse, it appears there is confusion across the Commonwealth. NVRC intends on discussing asset management systems in the near future within the Northern Virginia MS4 Workgroup and highly recommends that DEQ develop a webinar and guidance on the BMP Warehouse and data distribution.**

Table 3. 2017 and 2025 Development BMPs

2017 Progress LAPG BMPs	Acres	%
Wet Ponds and Wetlands	18,289	23.5
Dry Extended Detention Ponds	17,120	22.0
Stormwater Performance Standard-Stormwater Treatment	16,165	20.8
Dry Detention Ponds and Hydrodynamic Structures	13,393	17.2
Erosion and Sediment Control Level 1	6,564	8.4
Nutrient Management Plan	2,747	3.5
Infiltration	1,861	2.4
Stormwater Performance Standard-Runoff Reduction	631	0.8
Bioretention/raingardens - A/B soils	405	0.5
Filtering Practices	240	0.3
Bioretention/raingardens - C/D soils	185	0.2
Impervious Surface Reduction	80	0.1
Bioswale	71	0.1
Permeable Pavement	15	0.0
Vegetated Open Channels - C/D soils	7	0.0
Forest Planting	6	0.0
Vegetated Open Channels - A/B	1	0.0
Total	77,780	100

2025 Phase II WIP LAPG BMPs	Acres	%
Nutrient Management Plan	65,211	44.9
Wet Ponds and Wetlands	18,727	12.9
Dry Extended Detention Ponds	18,399	12.7
Filtering Practices	10,286	7.1
Infiltration	9,721	6.7
Dry Detention Ponds and Hydrodynamic Structures	9,593	6.6
Bioretention/raingardens - A/B soils	4,971	3.4
Impervious Surface Reduction	4,409	3.0
Erosion and Sediment Control Level 1	1,877	1.3
Street Cleaning	1,203	0.8
Forest Buffer	448	0.3
Vegetated Open Channels - A/B	242	0.2
Forest Planting	111	0.1
Permeable Pavement	10	0.0
Total	145,208	100

Phase III WIP BMPs

Development BMPs

While examining the static BMP implementation levels for 2017 and 2025 provided one level of insight, examining the time series of implementation between 2009 and 2017 provided the most amount of information, it also raised a number of questions regarding the quality of the data for a number of BMPs.

Producing a time series of the BMP implementation between 2009 and 2017 produced a quite remarkable linear relationship for almost all development BMPs. An example of that relations can be seen in Figure 11 for the acres under stormwater treatment by Dry Detention Ponds and Hydrodynamic Structures between 2009 and 2017. As can be seen from the graph the relationship produced a coefficient of determination (R^2) of 0.85, which is considered to be quite high. Quite a number of BMPs showed relationships even greater.

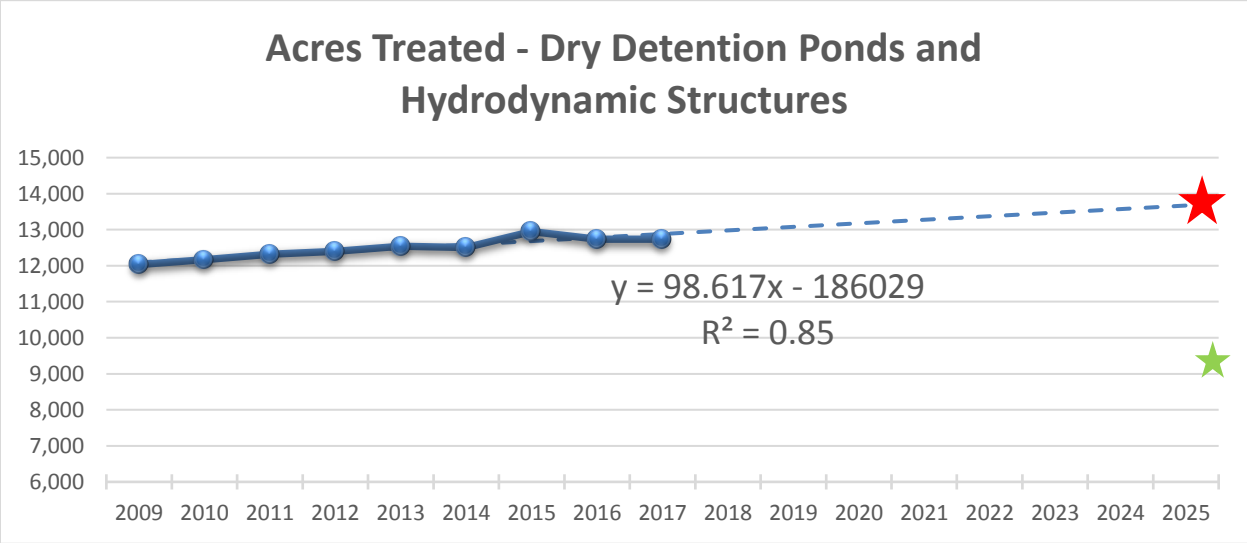

Figure 11. Acres treated Cry Detention Ponds between 2009 and 2017

Based upon this relationship it was possible to developed a projected number of acres to be under stormwater treatment by the Dry Detention Ponds and Hydrodynamic Structures in 2025 by extrapolation. The red star in Figure 11 is the 2025 extrapolated acres and the green star is the number of acres in the Phase II WIP. The stakeholders felt that this regression prediction meet a much higher standard than that of picking projected BMP implementation by 2025 based upon best professional judgement and recommended that for all BMPs where there was a strong relationship, that this method be used to develop the Phase III WIP input deck. In the event that a good statistical relationship could not be developed, and/or a defensible number could not be generated, the default conservative approach was to utilize the Phase II WIP

number. Individual plots for all of the BMPs in the input deck can be seen in Appendix C of this report.

Natural BMPs

As previously mentioned, the acres for the Urban Stream Restoration BMP in CAST is missing data not previously recorded from Fairfax County. The Workgroup felt that it would be appropriate to augment the existing CAST data with the yearly implementation data from the County to predict a Phase III WIP value. This decision added some 46,000 linear feet to the analysis. The resulting time series plot can be seen below in Figure 12.

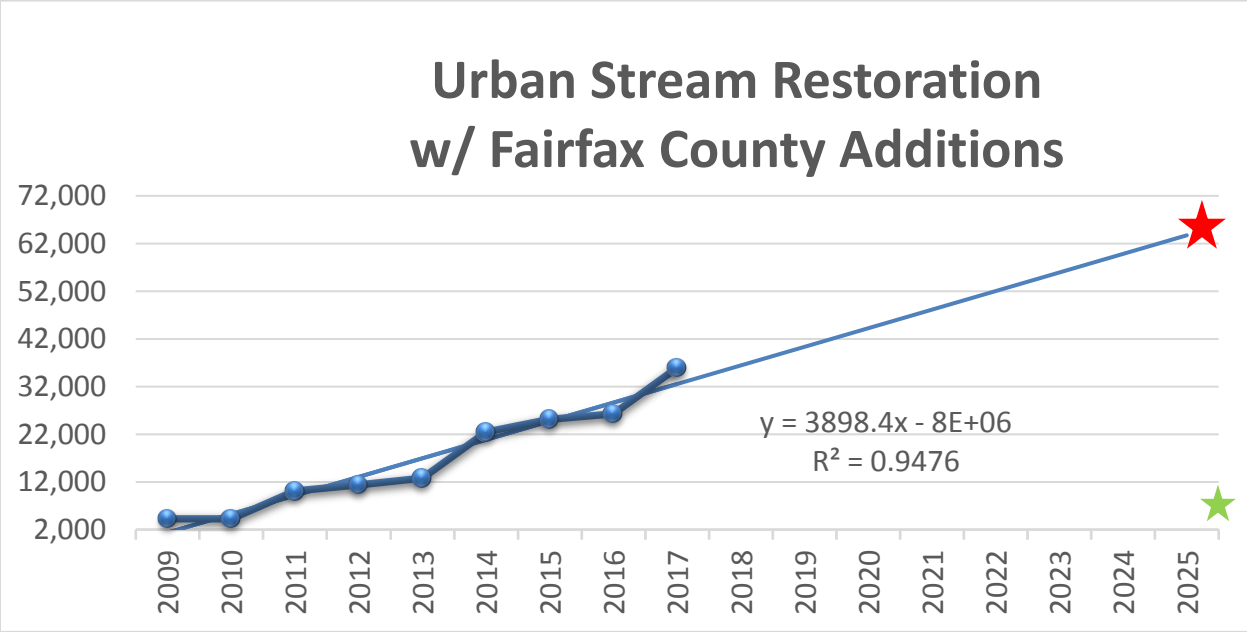

Figure 12. Acres of Urban Stream Restoration with Fairfax County Additions

Septic BMPs

Producing time series plots of the Septic BMPs between 2009 and 2017 further enhanced the belief that the CAST septic numbers are of limited value. With the exception of Septic Pumping, which is a annual reporting practice, the BMPs are cumulative and should at worst be flat at best be increasing over time. The exception to that rule would be if a BMP is removed from CAST for the lack of inspection or failure (Virginia BMP Verification, Tracking and Reporting Guidelines). There were a number of newer technology septic system BMPs that showed a decreasing trend over time. An example of that trend can be seen in Figure 13 for the Conventional Septic Secondary Treatment BMP. The Stakeholders were at a loss as to explain the trend for a number of the BMPs. Individual plots for all of the Septic BMPs in the input deck can be seen in Appendix C of this report.

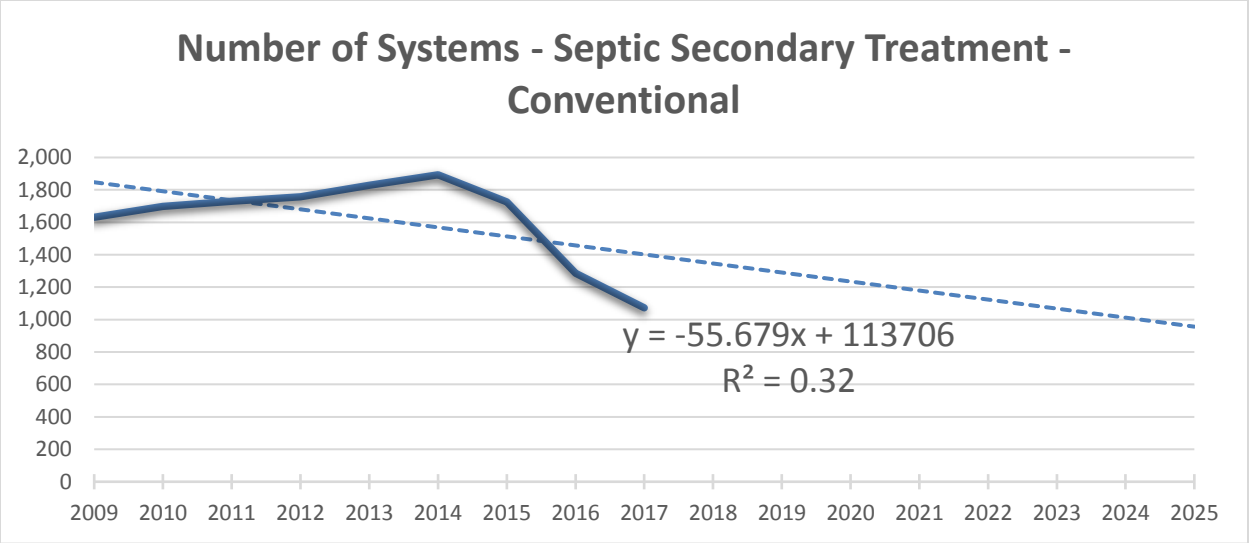

Figure 13. Conventional Septic Secondary Treatment BMP

WIP III Input Deck

Based upon the methodology described in the prior section, a Phase III Input deck of BMPs was assembled and can be seen in Tables 4 and 5 below. The values in red failed to produce a good statistical relationship and a defensible number could not be generated by other means so the default Phase II WIP number was utilized. The implementation levels were adopted unanimously by the Stakeholders.

Table 4. Phase III WIP Input Deck Values - Development BMPS

LAPG BMPs (grey background are Annual BMPs)	WIP 2	WIP 3
Bioretention/raingardens - A/B soils	4,971	500
Bioretention/raingardens - C/D soils	0	300
Bioswale	0	115
Dirt & Gravel Road Erosion & Sediment Control	104	100
Dirt & Gravel Road Erosion & Sediment Control - Outlets	254	250
Dry Detention Ponds and Hydrodynamic Structures	9,593	13,600
Dry Extended Detention Ponds	18,399	20,000
Filtering Practices	10,286	450
Forest Buffer	448	448
Forest Planting	111	100
Impervious Surface Reduction	4,409	100

Infiltration	9,721	2,140
Nutrient Management Plan	65,211	15,000
Permeable Pavement	10	24
Storm Drain Cleaning	0	0
Stormwater Performance Standard-Runoff Reduction	0	800
Stormwater Performance Standard-Stormwater Treatment	0	20,000
Street Cleaning	1,203	1203
Tree Planting - Canopy	0	0
Vegetated Open Channels - A/B	242	1
Vegetated Open Channels - C/D soils	0	10
Wet Ponds and Wetlands	18,727	21,000

Table 5. Phase III WIP Input Deck Values - Natural BMPS

LAPG BMPs (grey background are Annual BMPs)	WIP 2	WIP 3
Algal Flow-way Non-Tidal	0	0
Algal Flow-way Tidal	0	0
Algal Flow-way Tidal Monitored	0	0
Urban Shoreline Management	0	150
Non-Urban Stream Restoration		31,000
Urban Stream Restoration	8,112	62,000
Wetland Enhancement	0	0
Wetland Rehabilitation	0	0
Septic Connection	5,576	400
Septic Denitrification-Conventional	9,900	1,600
Septic Denitrification-Enhanced	0	700
Septic Effluent - Enhanced	0	1
Septic Pumping	8,314	8,300
Septic Secondary Treatment Conventional	0	1,800
Septic Secondary Treatment Enhanced	0	50

WIP III Loadings

One issue that was identified by NVRC with CAST, with respect to the LAPG Boundaries, was that when cast aggregated or disaggregated the loadings data at different scales, different values would be produced. This issue was confirmed by DEQ Staff and the developers of CAST at the Chesapeake Bay Program. In order to have a "apples to apples" comparison of the proposed regional Phase III Input deck to the DEQ provided goal, the Phase II VA Specified Scenario was re-run at the PDC scale. The scenario was produced by NVRC and duplicated by DEQ. The comparisons between the two scales for Phosphorus can be seen in Table 6.

Table 6. LAPG Generated at PDC Scale

LAPG Loads (LBS)	**Phosphorus (Edge of Tide)**	
	VA Specified WIP 2	WIP II DEQ Input @ PDC Scale
Sector: Non-Regulated Developed		
Non-Regulated Buildings and Other	13,274	13,213
Non-Regulated Roads	6,737	6,706
Non-Regulated Tree Canopy over Impervious	2,985	2,972
Non-Regulated Tree Canopy over Turf Grass	20,490	19,338
Non-Regulated Turf Grass	69,019	65,639
Total (lbs)	112,505	107,867
LAPG Delta (lbs)		
Sector: Natural		
Harvested Forest	191	191
Headwater or Isolated Wetland	270	275
Mixed Open	8,184	8,184
Non-tidal Floodplain Wetland	592	592
Shoreline	19,798	19,797
Stream Bed and Bank	100,970	102,331
True Forest	9,243	9,156
Water	5,253	5,253
Total (lbs)	144,502	145,779
LAPG Delta (lbs)		
Grand Total (lbs)	257,007	253,645
LAPG Delta (lbs)		

While the difference in loading is not significant, it is enough to throw off a "apples to apples" comparison between loading scenarios at various BMP implementation levels. For all nutrient

loading comparisons in this report the WIP II DEQ Input @ PDC Scale will be utilized. The Nitrogen comparison can be seen in Appendix D.

The input deck was processed through CAST and the results can be seen below in Table 7. The Stakeholder approved BMP implementation levels failed to achieve the DEQ goals by 2,954 lbs for Phosphorus and 93,488 lbs for Nitrogen. NVRC received direction from the Stakeholders not to develop any additional scenarios in order to meet the Goals. The Stakeholders felt that going beyond the BMP implementation levels developed by the regression methodology would require targeted retrofits. As the local governments in northern Virginia are not currently targeting retrofits in the unregulated areas, the Stakeholders considered those additional implementation levels to be unrealistic and unachievable. The Stakeholders were fully cognizant that NVRC would then be submitting an input deck that did not met the DEQ LAPG.

Table 7. Results of the Phase III WIP BMP Implementation Scenario

LAPG Loads (LBS)	Phosphorus (Edge of Tide)		Nitrogen (Edge of Tide	
	WIP II DEQ Input @ PDC Scale	PDC8 - WIP III	WIP II DEQ Input @ PDC Scale	PDC8 - WIP III
Sector: Non-Regulated Developed				
Non-Regulated Buildings and Other	13,213	14,714	185,287	207,268
Non-Regulated Roads	6,706	7,457	99,329	111,104
Non-Regulated Tree Canopy over Impervious	2,972	3,310	50,370	56,359
Non-Regulated Tree Canopy over Turf Grass	19,338	20,069	99,258	104,819
Non-Regulated Turf Grass	65,639	66,710	319,796	333,232
Total (lbs)	107,867	112,272	754,039	812,726
LAPG Delta (lbs)		**-4,394**		**-58,686**
Sector: Natural				
Harvested Forest	191	191	8,930	8,930
Headwater or Isolated Wetland	275	275	3,300	3,300
Mixed Open	8,184	8,184	38,526	38,526
Non-tidal Floodplain Wetland	592	592	8,592	8,592
Shoreline	19,797	19,797	28,006	28,006
Stream Bed and Bank	102,331	100,891	369,777	376,425

True Forest	9,156	9,156	161,386	161,385
Water	5,253	5,253	70,103	70,103
Total (lbs)	145,779	144,339	688,621	695,267
LAPG Delta (lbs)		**+1,440**		**-6,646**
Sector: Septic				
Rapid Infiltration Basin			558	558
Septic			241,218	269,373
Total (lbs)			241,777	269,932
Grand Total (lbs)	**253,645**	**258,588**	**1,684,437**	**1,780,631**
LAPG Delta (lbs)		**-2,954**		**-93,488**

Phase III WIP Projects Costs

Based upon the input deck developed by NVRC, and utilizing the default VA Cost Profile in CAST, an approximate annual cost of $77 Million dollars per year will be needed to implement the WIP (Table 7) The Stakeholders however consider that number to be potentially in error by several orders of magnitude.

Table 7. Phase III WIP BMP Implementation Projected CAST Costs

	Total Annualized Cost
Developed	**$58,928,996**
acres	
Non-Regulated Buildings and Other	$15,459,256
Non-Regulated Roads	$6,753,911
Non-Regulated Tree Canopy over Impervious	$3,176,371
Non-Regulated Tree Canopy over Turf Grass	$10,091,958
Non-Regulated Turf Grass	$23,447,209
feet	
Non-Regulated Roads	$291
Natural	**$9,231,557**
feet	
Shoreline	$7,508
Stream Bed and Bank	$9,224,050
Septic	**$9,249,327**
systems	
Septic	$9,249,327
Grand Total	**$77,409,879**

The most prevalent Stakeholder comments regarding cost were:

- The BMP cost in the default Virginia Cost Profile are woefully underestimated by several orders of magnitude.
- Much of implementation to date in the unregulated area has been opportunistic and represents low hanging fruit.
- Stream Restoration aside local governments do not typically program Capital Improvement Project (CIP) money for stormwater projects in the Unregulated Area unless they need to address a specific concern and the area is coincidently unregulated.
- As the number and complexity of the projects increase the cost per unit are expected to increase.
- Costs have been rising as restoration efforts have been increasing by all local government in the region. Competition for experienced design engineering firms, construction firms and materials are being realized.
- Much of the costs expended in the Unregulated area have been from the private side through the normal development process.

A good example of rising BMP costs can be seen Figure 14, submitted by Fairfax County, depicting the County's experience with the rising cost of Stream Restoration over the last several years. Currently the default Virginia profile lists Capital Costs for Stream Restoration at $408 per linear foot. Fairfax County's current costs are in the vicinity of $1,200 per foot with a maximum of $1,800 per foot. This range was confirmed by the City of Alexandria with its latest stream restoration effort coming in at $2,000 per foot.

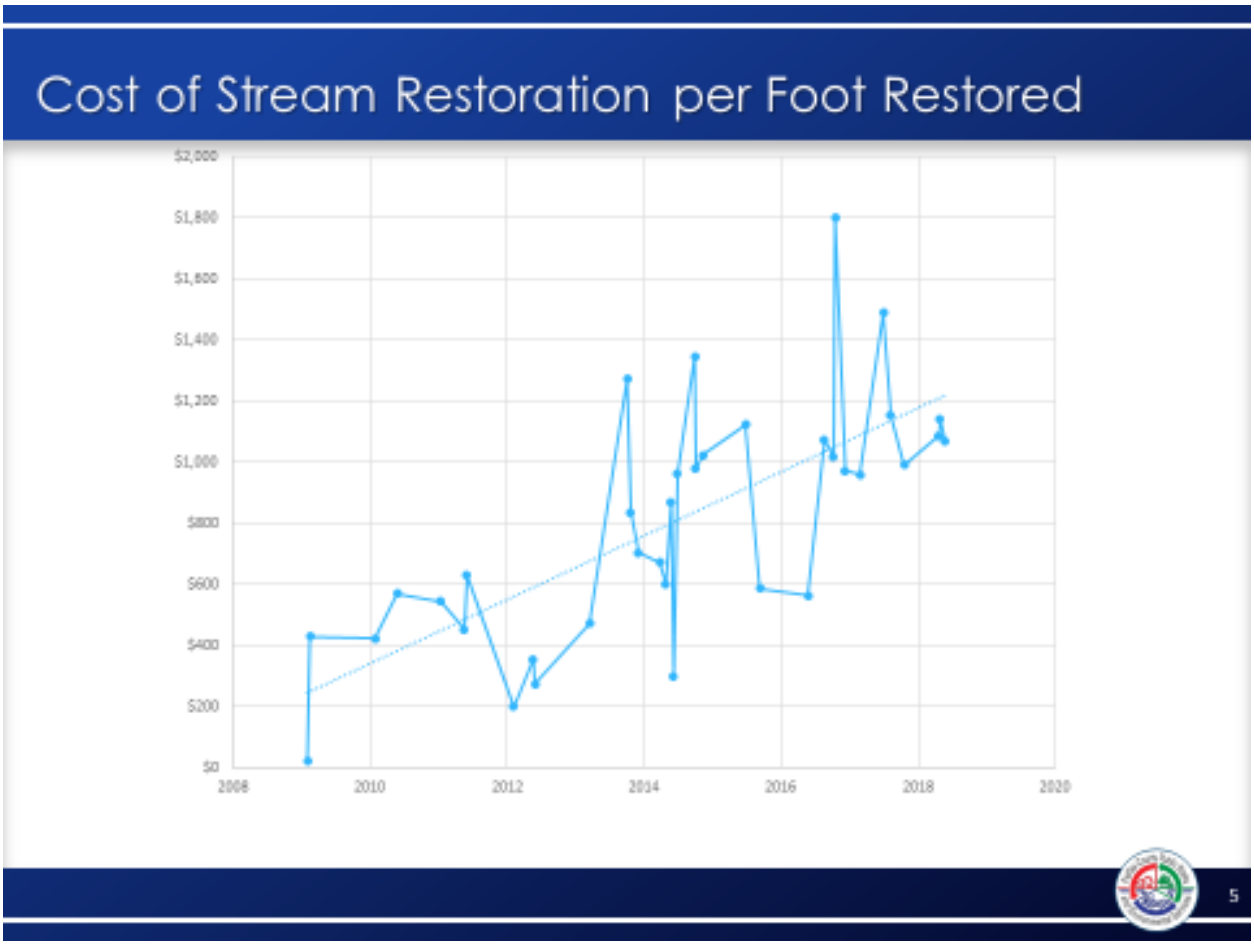

Figure 14. Fairfax County Stream Restoration Costs

Additional examples of cost information were provided by other local governments in northern Virginia for several other BMPs demonstrating the differences between CAST costs and actual costs.

	CAST	**Local Government**
Bioretention	$12K/Acre	$29K/Acre
Ext Det Pond	$4K/Acre	$9K/Acre

The Stakeholders were also concerned about what appears to be the lack of costs to develop and maintain a local government program. For instance, Urban Nutrient Management is one of the most cost effective BMPs because capital costs are listed as $0. The costs do not take into account what a government will need to contribute in staff or program funds to develop and maintain a jurisdiction wide program. For the most part right now Volunteer Master Gardeners through SWCD or Extension Offices currently account for most of the urban nutrient management beyond local government facilities. Volunteers, while cost effective, cannot be expected to develop nutrient management plans for the thousands and thousands of quarter-acre lots. Those kinds of programs will require a sustained local government infusion of funds to maintain staff and programs.

NVRC was contacted recently by a Research Professor from the University of Maryland Center for Environmental Science for NVRCs stream restoration costs. They are currently updating the Maryland cost profile with data from Maryland local governments. NVRC recommends that DEQ undertake a similar effort to update the default Virginia Cost Profile.

Gap Analysis

At the point of time it is fair to say, with the exception of stream restorations costs, the entirety of the unregulated area needs are unfunded. The priority for the local governments in the northern Virginia region currently are to meet required nutrient reduction within the regulated areas as required by MS4 Permits. Additional resources for retrofits in the unregulated area are unavailable at this point of time as many local governments are struggling to fund the current 40% reductions and the planned 100% reductions by 2025. As previously mentioned local governments are indirectly relying on development and redevelopment processes to partially fund BMP implementation and restoration efforts in the unregulated area.

One policy discussion arose during the Stakeholder process that could potentially increase the implementation of restoration efforts in the unregulated areas. Restoration project selection is often based around the concept of credit cost effectiveness, the lower the cost per pound removed per MS4 nutrient credit the more attractive a project is looked upon. However, with the current emphasis on restoration within the regulated area, potentially lower cost projects outside of the regulated area are being passed over because a local government must meet the TMDL baseload requirement before being able to claim any nutrient reduction credit for the MS4. If this policy was adjusted such that the locality could claim more nutrient reduction credits for the regulated area the cost per pound in the unregulated area could become more attractive. **NVRC recommends that DEQ examine the MS4 baseline load credit policy.**

Programmatic Actions

The Stakeholders were unwilling to commit to specific programmatic actions which would require local government funding due to the aspect that this is unregulated lands. While local government policies and programs typically make no distinction between regulated and unregulated lands, and are carried out jurisdiction wide, providing funding to specifically target the unregulated area was considered unacceptable. The Stakeholders did agree to a number of larger concept programmatic actions that they felt would help address the gaps. A fuller description of those can be found in the WIP III Programmatic template submitted with this report. A brief bullet list of these can be seen below:

- For all private/ publicly funded BMPs outside of an MS4 service area, provide incentives and/or technical assistance to report BMPs to the BMP Warehouse and perform inspections for verification.
- The state should take the lead in financing, developing, and constructing BMPs in nonregulated communities.
- Homeowner BMPs - Increase funding for VCAP, including SWCD staff to administer the program, technical assistance, and cost-share.
- Homeowner BMPs - Expand VCAP to allow localities that are not a part of SWCDs to participate
- Homeowner BMPs - Provide a tool for easy verification and reporting, follow up on the SMART tool being developed by the Alliance for the Chesapeake Bay
- Homeowner BMPs - Modify the requirements for inspection/verification of parcel-level BMPs on private property.
- Allow manufactured treatment devices (MTDs) to be counted for Bay Program credit following the development of a testing protocol
- Assess number of industrial facilities that should be regulated by VPDES but do not have permits
- Require industrial VPDES facilities to calculate stormwater run-off loads of N and P based on their impervious surface, develop TMDL Action Plans, and report implementation practices in the BMP Warehouse
- Assess the challenges of developing BMPs that treat roadway run-off for state owned roads by 1) Encourage the long-term goal for VDOT to develop strategies that improve local run-off as opposed to downstream regional BMPs, 2) Find ways for VDOT to obtain the right-of-way in a cost-effective manner, 3) Develop more strategies in addition to roadside ditch management and incorporate green infrastructure.
- Expand 5-year pump-out requirement in CBPA Act requirements to localities within the entire Chesapeake Bay watershed
- Allow for 319 funding to be allocated to the entire Chesapeake Bay watershed, since there is an approved IP for the Chesapeake Bay TMDL
- Commonwealth should promote land conversion from vacant urban lots or fallow agriculture fields to urban tree canopy

- Develop conservation easement ordinances in localities that do not already have one and/or broaden conservation easement requirements at the local level
- Develop protocols to provide credit for developable land that is placed under a permanent easement and thus cannot ever be developed.
- Separate state lands from locality lands and provide a state local area planning goal, currently state lands are included in locality loads unless excluded from the MS4 service area
- While this process has been primarily focused on the unregulated developed sector, it has brought attention to the fact that the MS4 sector has been complying with state permits but much of the efforts and implementation practices have not been recorded at the state level and reflected in the model. The projections for the future indicated growth in this sector, however if state-wide compliance is achieved, this sector should remain steady or decrease in terms of nutrient loads
- Continue to encourage the Commonwealth to adhere to the MS4 permit requirements long-term approach of 5%, 35%, and 60% reductions over 3 5-year permit cycles
- Remove the baseline requirements for MS4 credit collection of BMPs implemented on unregulated lands.
- Overall recognition of the voluntary nature of efforts in unregulated developed areas.

Appendix A: Letters of Participation

Loudoun County, Virginia
www.loudoun.gov
Office of the County Administrator
1 Harrison Street, S.E., P.O. Box 7000, Leesburg, VA 20177-7000
Telephone (703) 777-0200 • Fax (703) 777-0325 • coadmin@loudoun.gov

September 14, 2018

SEP 21 2018

Mr. Robert Lazaro
Northern Virginia Clean Water Partners Program
Northern Virginia Regional Commission
3040 Williams Drive, Suite #200
Fairfax, VA 22031

Dear Mr. Lazaro:

This letter serves to commit Loudoun County to actively participate in all meetings conducted by the Northern Virginia Regional Commission as part of the WIP III process and to provide input and recommendations for meeting Local Area Planning Goals (LAPGs). Specifically, Dennis Cumbie will participate with the PDC in its efforts to:

a) Review, and update as necessary, the draft BMP input deck provided by DEQ that reflects the selected mix of BMPs that meet the unregulated urban and developed lands that meet the Local Area Planning Goal for the PDC.
b) Identify local co-benefits achieved through the BMP input deck such as improving local water quality, advancing economic development opportunities, enhancing outdoor recreation, climate resiliency, flood control.
c) Identify programmatic actions to implement the selected mix of BMPs, any gaps in capacity and funding and necessary state authorities to implement the selected BMPs.
d) Updates of BMP information in DEQ's BMP Warehouse.

Please note that this letter reflects Loudoun County's commitment to participate with the Northern Virginia Regional Commission on the above activities. This letter does not represent a commitment to implement Best Management Practices, programmatic actions or strategies resulting from the PDC meetings.

We look forward to participating in this important initiative of the Commonwealth.

Sincerely,

Tim Hemstreet
County Administrator

ARLINGTON
VIRGINIA

OFFICE OF THE COUNTY MANAGER

2100 Clarendon Boulevard, Suite 302, Arlington, VA 22201
TEL 703-228-3120 FAX 703-228-3218 TTY 703-228-4611 www.arlingtonva.us

September 14, 2018

Robert W. Lazaro, Jr.
Executive Director
Northern Virginia Regional Commission
3040 Williams Drive, Suite 200
Fairfax, VA 22031

Dear Bob:

This letter serves to commit Arlington County to actively participate in all meetings conducted by the Northern Virginia Regional Commission as part of the WIP III process and to provide input and recommendations for meeting Local Area Planning Goals (LAPGs). Specifically, Demetra McBride (dmcbride@arlingtonva.us), Environmental Management Bureau Chief, will participate with the PDC in its efforts to:

a) Review, and update as necessary, the draft BMP input deck provided by DEQ that reflects the selected mix of BMPs that meet the unregulated urban and developed lands that meet the Local Area Planning Goal for the PDC.
b) Identify local co-benefits achieved through the BMP input deck such as improving local water quality, advancing economic development opportunities, enhancing outdoor recreation, climate resiliency, flood control.
c) Identify programmatic actions to implement the selected mix of BMPs, any gaps in capacity and funding and necessary state authorities to implement the selected BMPs.
d) Updates of BMP information in DEQ's BMP Warehouse

Please note that this letter reflects Arlington County's commitment to participate with the Northern Virginia Regional Commission on the above activities. This letter does not represent a commitment to implement Best Management Practices, programmatic actions or strategies resulting from the PDC meetings.

We look forward to participating in this important initiative of the Commonwealth.

Sincerely,

Mark J. Schwartz
County Manager

OFFICE OF THE CITY MANAGER
301 King St., Suite 3500
Alexandria, VA 22314

MARK B. JINKS
City Manager

703.746.4300
Fax: 703.838.6343

October 2, 2018

Mr. Robert W. Lazaro, Jr.
Executive Director
Northern Virginia Regional Commission
3040 Williams Drive, Suite 200
Fairfax, VA 22031

Dear Mr. Lazaro:

This letter also serves to commit the City of Alexandria to actively participate, to the extent feasible, in all meetings conducted by the Northern Virginia Regional Commission as part of the WIP III process and to provide input and recommendations for meeting Local Area Planning Goals (LAPGs). Specifically, Jesse Maines, Division Chief of Stormwater Management for Transportation and Environmental Services or designee will participate with the PDC in its efforts to:

a) Review, and update as necessary, the draft BMP input deck provided by DEQ that reflects the selected mix of BMPs that meet the unregulated urban and developed lands that meet the Local Area Planning Goal for the PDC.
b) Identify local co-benefits achieved through the BMP input deck such as improving local water quality, advancing economic development opportunities, enhancing outdoor recreation, climate resiliency, flood control.
c) Identify programmatic actions to implement the selected mix of BMPs, any gaps in capacity and funding and necessary state authorities to implement the selected BMPs.
d) Updates of BMP information in DEQ's BMP Warehouse

Please note that this letter reflects commitment to participate with the Northern Virginia Regional Commission on the above activities. This letter does not represent a commitment to implement Best Management Practices, programmatic actions or strategies resulting from the PDC meetings.

We look forward to participating in this important initiative of the Commonwealth.

Sincerely,

Mark B. Jinks
City Manager

cc: Emily A. Baker, Deputy City Manager
Yon Lambert, Director, Transportation and Environmental Services
Bill Skrabak, Deputy Director, Transportation and Environmental Services
Jesse Maines, Division Chief, Stormwater Management, Transportation and Environmental Services

CITY OF MANASSAS PARK

City Hall • One Park Center Court • Manassas Park, Virginia 20111-2395
(703) 335-8800 • Fax (703) 335-0053
www.cityofmanassaspark.us

RE: WIP III Process

Dear Robert Lazaro:

This letter also serves to commit the City of Manassas Park to actively participate in all meetings conducted by the Northern Virginia Regional Commission as part of the WIP III process and to provide input and recommendations for meeting Local Area Planning Goals (LAPGs). Specifically, Allan Rowley will participate with the PDC in its efforts to:

Review, and update as necessary, the draft BMP input deck provided by DEQ that reflects the selected mix of BMPs that meet the unregulated urban and developed lands that meet the Local Area Planning Goal for the PDC.

Identify local co-benefits achieved through the BMP input deck such as improving local water quality, advancing economic development opportunities, enhancing outdoor recreation, climate resiliency, flood control.

Identify programmatic actions to implement the selected mix of BMPs, any gaps in capacity and funding and necessary state authorities to implement the selected BMPs.

Updates of BMP information in DEQ's BMP Warehouse

Please note that this letter reflects the City of Manassas Park's commitment to participate with the Northern Virginia Regional Commission on the above activities. This letter does not represent a commitment to implement Best Management Practices, programmatic actions or strategies resulting from the PDC meetings.

Sincerely,

Laszlo Palko

Laszlo Palko

City Manager

October 11, 2018

Robert W. Lazaro, Jr.
Executive Director
Northern Virginia Regional Commission
3040 Williams Drive, Suite 200
Fairfax, VA 22031

Dear Robert Lazaro:

This letter also serves to commit the City of Manassas to actively participate in all meetings conducted by the Northern Virginia Regional Commission as part of the WIP III process and to provide input and recommendations for meeting Local Area Planning Goals (LAPGs). Specifically, Tony Dawood will participate with the PDC in its efforts to:

a) Review, and update as necessary, the draft BMP input deck provided by DEQ that reflects the selected mix of BMPs that meet the unregulated urban and developed lands that meet the Local Area Planning Goal for the PDC.
b) Identify local co-benefits achieved through the BMP input deck such as improving local water quality, advancing economic development opportunities, enhancing outdoor recreation, climate resiliency, flood control.
c) Identify programmatic actions to implement the selected mix of BMPs, any gaps in capacity and funding and necessary state authorities to implement the selected BMPs.
d) Updates of BMP information in DEQ's BMP Warehouse

Please note that this letter reflects the City of Manassas' commitment to participate with the Northern Virginia Regional Commission on the above activities. This letter does not represent a commitment to implement Best Management Practices, programmatic actions or strategies resulting from the PDC meetings.

We look forward to participating in this important initiative of the Commonwealth.

Sincerely,

W. Patrick Pate
City Manager

9027 Center Street | Manassas, VA | 20110 | 703-257-8212

County of Fairfax, Virginia

To protect and enrich the quality of life for the people, neighborhoods and diverse communities of Fairfax County

November 02, 2018

Mr. Robert Lazaro, Executive Director
Northern Virginia Regional Commission
3040 Williams Drive, Suite 200
Fairfax, VA 22031

Dear Mr. Lazaro:

This letter also serves to commit Fairfax County to actively participate in all meetings conducted by the Northern Virginia Regional Commission as part of the WIP III process and to provide input and recommendations for meeting Local Area Planning Goals (LAPGs). Specifically, Heather Ambrose will participate with the PDC in its efforts to:

a) Review, and update as necessary, the draft BMP input deck provided by DEQ that reflects the selected mix of BMPs that meet the unregulated urban and developed lands that meet the Local Area Planning Goal for the PDC.
b) Identify local co-benefits achieved through the BMP input deck such as improving local water quality, advancing economic development opportunities, enhancing outdoor recreation, climate resiliency, and flood control.
c) Identify programmatic actions to implement the selected mix of BMPs, any gaps in capacity and funding and necessary state authorities to implement the selected BMPs.
d) Updates of BMP information in DEQ's BMP Warehouse.

Please note that this letter reflects Fairfax County's commitment to participate with the Northern Virginia Regional Commission on the above activities. This letter does not represent a commitment to implement Best Management Practices, programmatic actions or strategies resulting from the PDC meetings.

We look forward to participating in this important initiative of the Commonwealth.

Sincerely,

Bryan J. Hill
County Executive

cc: Randy Bartlett, Department of Public Works and Environmental Services
Heather Ambrose, Department of Public Works and Environmental Services

Office of the County Executive
12000 Government Center Parkway, Suite 552
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703-324-2531 TTY 711, Fax 703-324-3956
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Town of Leesburg Virginia

KAJ H. DENTLER
Town Manager

25 West Market Street ■ Leesburg, Virginia 20176 ■ 703-771-2700 ■ kdentler@leesburgva.gov ■ www.leesburgva.gov

September 17, 2018

Mr. Robert W. Lazaro, Jr.
Executive Director
Northern Virginia Regional Commission
3060 Williams Drive, Suite 200
Fairfax, VA 22031

Dear Mr. Lazaro:

This letter serves to commit the Town of Leesburg to actively participate in all meetings conducted by the Northern Virginia Regional Commission as part of the WIP III process, and to provide input and recommendations for meeting Local Area Planning Goals (LAPGs). Specifically, Plan Review Director, Bill Ackman, and Public Works Manager, Charlie Mumaw, will participate with the PDC in its efforts to:

a) Review, and update as necessary, the draft BMP input deck provided by DEQ that reflects the selected mix of BMPs that meet the unregulated urban and developed lands that meet the Local Area Planning Goal for the PDC.
b) Identify local co-benefits achieved through the BMP input deck such as improving local water quality, advancing economic development opportunities, enhancing outdoor recreation, climate resiliency, and flood control.
c) Identify programmatic actions to implement the selected mix of BMPs, any gaps in capacity, funding, and necessary state authorities to implement the selected BMPs.
d) Update BMP information in DEQ's BMP Warehouse.

Please note that this letter reflects the Town of Leesburg's commitment to participate with the Northern Virginia Regional Commission on the above activities. This letter does not represent a commitment to implement Best Management Practices, programmatic actions, or strategies resulting from the PDC meetings.

We look forward to participating in this important initiative of the Commonwealth.

Sincerely,

Kaj H. Dentler
Town Manager

Cc: Keith Markel, Deputy Town Manager
Bill Ackman, Director of Plan Review
Renée LaFollette, Director of Public Works and Capital Projects Management
Charlie Mumaw, Public Works Manager

Appendix B: Stakeholder Meeting Summaries

Northern Virginia Regional Commission WIP III Local Engagement Meeting

August 17, 2018

Summary

On August 17, 2018, the Northern Virginia Regional Commission (NVRC) hosted at their office in Fairfax its first Chesapeake Bay WIP III local coordination meeting with local stakeholders, approximately 18 participants. The purpose of this meeting was to provide those present with information and answer any questions. Norm Goulet let the meeting, providing information on the following: background of the TMDL, WIP development progress and timeline, 2017 nutrient progress, unregulated lands in Northern Virginia, BMPs for the unregulated developed sector, and next steps.

The second meeting will be held on Friday, September 21st at 10 am at NVRC's office in Fairfax.

Summarized below are the main comments and questions that came out of the meeting for consideration by DEQ and/or others.

Comments:

- Programmatic:
  - Revisit "baseline load" for retrofits by MS4 in unregulated lands.
  - Expand VCAP beyond SWCD, provide more funding for homeowner BMPs.
  - Provide funding opportunity to complete work in nonregulated areas (such as retrofitting, reporting and verifying BMPs)
- Technical:
  - Get an account of BMPs (regulated and non-regulated)
  - Separate state-owned lands from PDCs unregulated lands

Questions:

- How to address climate change when the targets could shift because of it?
- Are there any USGS stream gages/monitoring stations located in Northern Virginia that will soon have sufficient years of data to be part of the long-term trend analysis? If so, where are those stations and when will they be able to be used in this type of analysis?

Meeting Notes

Summarized below is the information presented and key points and/or questions raised during the meeting:

WIP III Process

- Noted the difference in Phase III from previous efforts is that growth is incorporated (anticipated for 2025) and EPA expects climate change to be addressed (programmatically or numerically).
- Information provided on the 2017 progress/trends. Comment that it was surprising there were few USGS stations for long-term analysis (10 years or more data) in the Northern Virginia area. One participant noted some USGS stations in Fairfax should be reaching the 10-year limit and might be available to include in the near future. Suggestion to ask USGS as to whether there are stations that will come on line (and when) to provide long-term trend on the Northern Virginia area.
- The tasks ahead were identified as follows:
    - Revise input deck
    - Review/update (where necessary), combine agriculture and urban BMP input deck
        - Questions addressed during this part pertained to the information that a locality could obtain that is specific to them. A brief explanation of the information CAST can display was provided.
    - Develop regional implementation strategies
    - Outline resources needed for implementation
    - List local co-benefits achieved through BMPs and strategies

PDCs Responsibility

- Norm clarified the PDCS are not addressing load reductions associated with regulated lands as that is being addressed by DEQ through permits. MS4 Phase IIs will be addressing WIP II numbers while it is less clear what Phase I permits will be required to address (WIP II or III).
- A participant commented that during a VAMSA conference call the previous day about the MS4 Phase II general permit, there was anxiety voiced by some of providing land use at the outfalls to DEQ. The participant questioned if the reason for that anxiety was because of this effort? Norm responded, yes, it was his opinion that DEQ was trying to get more specificity for the model. He envisions that eventually the Bay model will be a collection of models at a small watershed level (i.e. Potomac, Shenandoah, etc.) that will feed into the larger Bay model. It is the presumption that this will be lead to greater accuracy, though noted there are uncertainties in some information such as fertilizer application rates.
- Norm noted Virginia will submit the WIP III with or without locality information. This effort is to obtain that local information. He also noted that participation in this effort does not translate to local requirements, that this is addressing non-regulated. He mentioned though that if reductions cannot be achieved on the LA side, DEQ will have to look at the WLA side.

Model Related

- There is an error in CAST for the baseline condition numbers for this area. For a few localities, the unregulated and MS4 regulated loads are flipped. The errors are being corrected and scenarios will be rerun, resulting in slight changes in the numbers.
- In response to a question regarding sediment load reductions, Norm noted that there is not a large emphasis on sediment. The assumption is that if phosphorus reductions are being achieved, reductions for sediment are as well.
- One participant questioned how well the model predicted current conditions. Norm answered that the calibration of the model was good, and above the fall-line, the R^2 values were very good. However, below the fall line, the estuarine, he was less sure as he had not reviewed that portion yet.
- Information on the percent total land use per category that comes from CAST was provided. It was noted that the viewer appeared to be out of date due to the information for Loudoun not appearing correct. It was noted the data in CAST appeared correct, but Loudoun could provide their data and data for the Town of Leesburg. During this discussion, the extent of the MS4 area for VDOT was clarified (their roads within the census urbanized area) and how that information is incorporated.

WIP III Challenges Identified

- Climate Change:
    - This topic generated discussion on the complexity of trying to understand the effects from climate change, which may result in a mix of positive and negative outcomes for the Bay. The over-arching question that stemmed from this discussion is how to address climate change when the targets could shift because of it. Norm noted that modeling was conducted to understand the impact, resulting in an additional 6 million lbs of nitrogen (caused by increase in algal growth). It was noted uncertainty in the modeling comes more from modeling the estuarine.
    - One participant questioned if the fertilizer effect (due to climate change) is considered, to which it is thought it is not. Another participant commented the TMDL could be invalidated by climate change causing changes in aquatic life (population dynamics, etc.) and current reduction targets, or causing us to target the wrong endpoints. Another participant noted that the effects from climate change will not be felt until after the planning horizon for this effort.
    - Norm noted there will be a workshop held at the end of September to look at modeling of climate change and what it means. He also discussed that if the decision was to address climate change programmatically, by 2021/2022, numeric

targets must be incorporated. These targets would be part of the WLA and LA, not the MOS.

- The Conowingo Dam was revisited as to how it is viewed in the model. It was identified that this feature is no longer acting as a BMP as previously thought, but has reached equilibrium, resulting a reductions needs to be sought elsewhere. To address this issue, a separate WIP will be developed for the Conowingo Dam, with all states participating. At this time, it is unknown what Virginia's responsibility will be, but hope to be minimal as Virginia is outside of its watershed.

Local Action Plan Goals for PDC 8

- Reductions comparable with Phase II, but target may shift some depending on outcome of revisions mentioned earlier. Comment this PDC is in fairly good shape to meet local responsibilities compared to some other PDCs.
- A participant questioned if there should be an assumption that no increase results from new developed lands because the most current practices will be implemented (i.e. nutrient neutral). Response was there is a disconnect in the model as to how those activities are viewed, with a load still accounted for based upon land area.
- Noted the land change modeling has a bias toward loss of agriculture. Noted in Northern Virginia, there will be more loss to forest than agriculture (currently the greater loss is shown in agriculture).
- Stream restoration efforts should be added to the BMP warehouse to be credited, not just reported in the MS4s annual report. It was noted that the reductions from this activity is counted towards the natural and not developed subcategory.
- Dry detention ponds, which have low removal efficiencies, are good candidates for retrofit to increase reductions.
- Nutrient management plans (NMP) are good options to pursue due to low resource needs.
    - Question if DEQ activity pursues tracking NMP in nonregulated areas? Fairfax County noted they only report those required and they are not tracking down or reporting those NMPs in nonregulated areas.
    - Recommended communicating with Counties, jurisdictions, SWCDs and ag extension offices as to known NMPs.
- Street sweeping activities were not reported in 2017 due to incorrect units. If localities want this activity to be credited, they need to start using the new methodology and report.
- Outfall restoration may be an activity that can receive credit. Norm mentioned there was a group working to develop practices and specs for this to be included as a BMP. VDOT is an active participant. Loudoun County voiced their interest in having this type of BMP and their desire to participate in the group.
- DOF commented that new urban BMP tree planting is reported through DOF. DOF is working on developing a phone app that enables a person to report from the field. Noted

it is self-reporting and inspected by another, a certified arborist. They are still working on the reporting process, but once complete will hold a training event.

Planning Steps

- Assess current status
    - Define locations and estimated loads for unregulated development and septic. Noted a review of the septic information is need to identify any incorrect information as it appears there may be some errors based upon information specific to Blue Plains WWTP.
- Identify gaps (what is not reported?)
- Propose strategies

WIP 3 Meeting #1
August 17, 2018
Sign-In Sheet

Name	Representing	Phone	Email
Chris Stone	Loudoun County		chris.stone@loudoun.gov
Karen Hall	Stantec on behalf of VDOT		Ashley.Hall@Stantec.com
Karl Berger	MWCOG		kberger@mwcog.org
Diana Handy	Arlington Co		dhandy@arlingtonva.us
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WIP 3 Meeting #1
August 17, 2018
Sign-In Sheet

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Corey Miles	NVRC		
Jim Mcblowe	DOF		

Northern Virginia Regional Commission WIP III Local Engagement Meeting

September 21, 2018

Summary

On September 21, 2018, the Northern Virginia Regional Commission (NVRC) hosted at their office in Fairfax its second Chesapeake Bay WIP III local coordination meeting with local stakeholders. The purpose of this meeting was to provide those present with information, answer any questions and obtain feedback on NVRC's proposed course of action. Norm Goulet let the meeting, providing information on the following: level of effort needed for Virginia, Local Area Planning Goals (LAPGS) for PDC 8, clarified differences in accounting effort under the Chesapeake Bay TMDL vs. Local TMDLs for MS4s, load sources for unregulated and natural lands, BMP implementation, input deck approach for PDC 8 and next steps.

The third meeting will be held on October 26th at 10 am at NVRC's office in Fairfax.

Meeting Notes

Summarized below is the information presented and key points and/or questions raised during the meeting:

WIP III Differences from Phase II

- Conowingo Dam – identified its reached equilibrium and no longer acts as a BMP as previously thought/modeled. It is still unresolved as to how to handle this feature and which jurisdictions will be responsible. A workgroup will be created to develop a separate watershed plan.
- Climate Change – impacts from climate change are incorporated into Phase III. States can address it as either numeric or programmatic actions (latter till 2021 to allow science to provide more information, which then numeric values will be required). Virginia has not announced how this will be addressed.
- Growth – This is factored into Phase III by using 2025 land use (which was not considered in Phase II). Phase II was rerun with the Phase 6 model.

PDCs Responsibility

- Norm clarified the PDCS are addressing load reductions associated with unregulated lands, regulated are being addressed by DEQ through permits. MS4 Phase IIs will be addressing WIP II numbers while it is less clear what Phase I permits will be required to address (WIP II or III). He recommended that permit holders focus on meeting permit requirements.

- The nuance differences in "bean" counting under MS4 vs. Chesapeake Bay TMDL were identified.
    - Boundaries differ. MS4 regulated area, which is the extent to which permit requirements are applied versus locality boundaries.
    - BMP counts differ in that those submitted to the BMP warehouse without location information are modeled as being distributed throughout the jurisdiction. Recommended using the BMP warehouse to report implemented BMPs.
        - Fairfax County commented that updates are needed to this database to enable more detailed reporting. Norm recommended after this process, it would be beneficial to meet with DEQ to discuss proposed updates as they are currently updating the database.
        - It was noted that the information submitted by localities on their BMPs and which receive credit in the Bay model can be viewed in CAST.
    - Crediting is only achieved if the information is submitted in a way that is congruent with Chesapeake Bay requirements. If not, then Virginia is not able to take credit for those BMPs. The example provided was street sweeping must be reported in linear feet and not pounds. It was noted if not obtaining Bay credit, the MS4 still obtains credit under their local TMDL.
        - It noted that the stream restoration credit comes out of natural and not developed category, because it comes out of bed and bank.
- Norm noted Virginia will submit the WIP III with or without locality information. This effort is to obtain that local information. He also noted that participation in this effort does not translate to local requirements, that this is addressing non-regulated. He mentioned though that if reductions cannot be achieved on the LA side, DEQ will have to look at the WLA side.

Local Action Plan Goals (LAPGs) and Load Sources

- Achievements to be shown in the grand total, not concerned per sector.
- Comment this PDC is in fairly good shape to meet local responsibilities compared to some other PDCs.
- PDC 8 Natural Load Sources
    - Harvested forest is for lands in which trees are removed at any time. The values for 2017 progress are 583 and 3,731 in WIP II 2025. DOF voiced concern over these numbers and questioned the validity of the data from which that was developed. Norm will coordinate with USGS to inquire where the values come from and coordinate with DOF on his findings.
- Noted the land change modeling has a bias toward loss of agriculture. Noted in Northern Virginia, there will be more loss to forest than agriculture (currently the greater loss is shown in agriculture).

- Norm noted that the unregulated and regulated land values for Manassas, Manassas Park and Falls Church are flipped in the model. These are not able to be revised as the model is currently finalized and they will have to move forward with those
- An overview of the septic system number of units were provided per jurisdiction. Norm requested each locality review those numbers against their information to identify any errors. He noted these values are jurisdiction wide.
- It was noted that for a certain BMP type, could only obtain credit up the point which the load is reduced to zero for that BMP, as value cannot go negative.
- Question of the quality of data reported from VDH and DOF to DEQ. Noted that if the data is not being entered (or not accurate data) into the BMP warehouse, the information is not known and its not receiving credit.

Planning Steps

- Developing the input deck for PDC 8
    - NVRC proposes to develop the input deck at a PDC level, not at locality level, therefore not asking for the localities to report how they anticipate they will meet their portion of the LAPGs. Instead, NVRC will develop the input deck using stormwater performance standards and apply a linear regression to develop a projection for reduction for the BMPs.
    - The reductions will be spatially distributed across the PDC.
    - This is viewed as removing the implication of commitment being assigned to each locality.
    - All present were in agreement with this approach.
    - Norm will run several scenarios (comment was to throw out the outliers) for review at the Oct. meeting.
    - Annual BMPs will be handled using was in Phase II, with exception of nutrient management plans due to the larger portion proposed but did not become a reality. So reductions from those will be made up in other BMPs.
- The October 26th meeting will entail going over the PDC wide scenarios developed by NVRC for input and feedback by the localities.
- A fourth meeting will be held in November that will include the SWCDs, to discuss combining the input decks into one.
- Dec 15th – deadline to submit the input deck to DEQ

WIP 3 Meeting #2
September 20, 2018
Sign-In Sheet

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WIP 3 Meeting #2
September 20, 2018
Sign-In Sheet

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Northern Virginia Regional Commission WIP III Local Engagement Meeting

October 26, 2018

Summary

On October 26, 2018, the Northern Virginia Regional Commission (NVRC) hosted at their office in Fairfax its third Chesapeake Bay WIP III local coordination meeting with local stakeholders. The purpose of this meeting was to discuss the draft WIP III input deck for PDC 8, which is at a PDC level and uses a regression analysis to develop a projection for each BMP proposed. Norm Goulet let the meeting, going over the proposed level of BMP implementation and associated pollutant reductions and how those measure up against the Local Area Planning Goals (LAPGs) for PDC 8.

The fourth meeting will be held on November 19th at 10 am at NVRC's office in Fairfax.

Meeting Notes

The meeting began with an exercise for the tree planting BMP, asking meeting attendees to identify the number of tree planting (minimum 1 acre contiguous) they anticipate may occur by 2025. The answers ranged widely among those present, from 0 to 1,500 acres. The exercise illustrated the difficulty in arriving at a defensible number using an approach that asked each jurisdiction to forecast the anticipated level of implementation for each BMP. Therefore, the approach NVRC proposed and the participants agreed to at the last meeting (held on October 26th) was to apply a regression analysis based upon existing BMP implementation (2009-2017) reported to CAST to forecast implementation from now to 2025.

During this exercise, DEQ staff asked if the localities had a tree-planting program. Loudoun mentioned they did, through the Soil and Water Conservation District (SWCD) that provides money to homeowners to plant trees.

DEQ noted during the meeting that the exercise to develop the WIP III input deck was to focus on practices (those identified in the WIP II input deck) that the PDC members feel are reasonable and will continue to be implemented and identify what additional work can reasonably be accomplished by 2025. In addition, to inform DEQ what is needed to accomplish the work identified.

Next, an overview of the BMP implementation projections proposed to be included in the PDC 8's WIP III input deck was provided with the assistance of a MS PowerPoint presentation (which can be accessed at: https://www.novaregion.org/DocumentCenter/View/12033/WIP-III-Meeting-3-Presentation-PDF). The discussion that surrounded each of those BMPs is summarized below:

- The graphs for each BMP show two values. The green star represents the WIP II value, whereas the red star represents the regression analysis and the draft value for the WIP III input deck. A deficit is shown when the green star is graphed higher than the red star.
- Nutrient Management Plans were estimated as a high implementation value in WIP II. There are many unknowns for this BMP, which shows a high degree of variability in the reported numbers in the previous years. This BMP is low cost with a high efficiency rate, but can be difficult tracking due to it being a three-year agreement. A conservative estimate of 1,500 was selected.
- Stream Restoration
    - Noted that if the stream design does not fall within the three subtypes of the Expert Panel Report, then the activity is accounted for in the non-urban category (or shows as unknown).
    - Fairfax County informed the group of a reporting issue they encountered in which they were only reporting in their MS4 report and not to the DEQ BMP Warehouse. They have since updated the BMP Warehouse with previously unreported 4,800 linear feet, but the information will not appear in CAST until a refresh is conducted. This is a significant increase to the BMP value of approximately 4,300 linear feet shown on the graph. It was discussed whether to update the stream restoration BMP to include the stream restoration they complete to better refine the values. The discussion concluded (after the meeting in email correspondence) to include Fairfax's information and update the regression analysis accordingly.
- Septic BMPs
    - City of Manassas Park verified with the local health department that they do not have any septic systems within their jurisdiction. Alexandria and Arlington also do not have any septic systems.
    - Loudoun County said they had a large number of abandoned (disconnected) septic systems that are not accounted for under the Septic Connection BMP because it was a converted use, meaning they did not connect to sewer (i.e. changed to a parking lot, etc.). The result is that those systems are no longer generating a load. In response, it was noted that those systems that were abandoned pre-2009 were accounted for already. If the systems were abandoned post-2009, suggested using the Septic Connection BMP as part of the LAP.
    - DEQ said they will address the issue identified of reporting and communications with VDH regarding septic pump-outs. Reporting directly to the BMP Warehouse was advocated. Loudoun noted they had an ordinance that requires the pumper to input data into a third party database.
    - DEQ said they will provide a table of the values DEQ received in the Chesapeake Bay reporting of the actual systems pumped in the Chesapeake Bay preservation

areas. While it was felt this information may not be helpful to refine the numbers, it was good information to be aware of and see.

The last topic discussed was the CAST scoping projections for 2025 based upon the projected BMP implementation. It was noted there is a scaling issue in CAST that affects the nutrient loading, so the WIP II values at the PDC scale were kept. Overall, for PDC 8, there are deficits in meeting the LAPG loads for both nitrogen and phosphorous in all scenarios. The question to kick off discussion was whether those present were comfortable with submitting a WIP III input deck to DEQ that is less than the LAPGs for PDC8. Below summarizes the discussion that followed:

- A comment that annual BMPs can be challenging due to difficulties with maintenance of structures outside of the regulated area.
- Storm draining cleaning outs were not reported so that BMP value is proposed to be zero.
- Comment that BMP implementation in both the regulated and unregulated area needs to considered together. Otherwise, it feels disconnected and difficult to see the big picture.
    - DEQ responded that DEQ was looking at both sides, with the regulated lands being addressed through the Chesapeake Bay Action Plans to address the wasteload allocation
    - One attendee questioned what the tool is to implement BMPs on unregulated lands. The response was the same tool(s) to implement those BMPs on regulated lands.
- DEQ commented that PDCs are being asked to submit an input deck that shows what they can reasonably do, with some stretch on some that they think they can do. Encouraged localities focus on protection of local waters, as that work also protects the benefits, thus being a "co benefit."
- Comment that the proposed methodology to develop PDC 8's input deck proposes a level of commitment similar to what has been done as it maintains the current trajectory of BMP implementation.

The discussion concluded with no decision on whether NVRC should move forward with the input deck as proposed or propose something more aggressive to more closely match the LAPGs for PDC 8. Following post-meeting email correspondence, it was decided to submit the draft input deck as is with the revision to include Fairfax County's unaccounted for stream restoration.

Throughout the meeting, the importance of reporting BMP implementation to the BMP Warehouse was commented upon. There is a general consensus that there may be data gaps due to inconsistent reporting by either localities or other agencies, such as DGIF or VDH, or only reporting BMPs implemented in regulated areas. Some commented reporting under their MS4 permit was confusing as to what BMP data is needed.

It was proposed the data needs to be run through a QA/QC process to ensure accuracy. It was commonly agreed that this was a large undertaking best pursued during the course of WIP III implementation and not at this time. However, where there are known data inconsistences and the updated information is readily available, such as the case with Fairfax County's stream restoration (in which approximately 4,800 linear feet was previously unaccounted for), it was generally agreed to update the data and corresponding projections.

WIP 3 Meeting #2
September 20, 2018
Sign-In Sheet

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Northern Virginia Regional Commission WIP III Local Engagement Meeting

November 19, 2018

Summary

On November 19, 2018, the Northern Virginia Regional Commission (NVRC) hosted at their office in Fairfax its fourth Chesapeake Bay WIP III local coordination meeting with local stakeholders. The purpose of this meeting was to wrap up discussion of the draft WIP III input deck for PDC 8, which is at a PDC level and uses a regression analysis to develop a projection for each BMP proposed. Norm Goulet let the meeting, going over a few revisions to the draft input deck to reflect revision to the urban stream restoration BMP to reflect Fairfax County information and how the drat input deck measures up against the Local Area Planning Goals (LAPGs) for PDC 8. Additionally, proposed Programmatic Actions and cost estimates were reviewed.

The meeting concluded with the attendees supporting the propose to submit to DEQ a draft input deck that falls short of the LAPGs for PDC 8. As for the Programmatic Actions, those will be revised to incorporate the comments from the group and be circulated by email for the groups concurrent before merging with the Soil and Water Conservation District's Programmatic Actions for submittal to DEQ.

Questions / Comments for DEQ:

1. MS4 related:
    a. There is confusion as to what BMPs a MS4 should report to DEQ under their MS4 annual report, if just those on regulated lands or also unregulated lands. In addition, through what mechanism this information is to be reported. Some noted they have reported through their Annual Report but that information never reached the BMP Warehouse. Commenters indicated a clear direction has not been provided from DEQ.
    b. What happens to crediting a BMP if a MS4 grows and BMPs implemented on unregulated lands now fall within the jurisdictional area of that MS4? Can the MS4 get the credit back? If so, it was noted that this creates more incentive for an MS4 to do work in unregulated areas.
2. Reporting of BMPs: Gaps in the data reported was commented upon in this and prior meetings. It was noted that the BMP warehouse does not have all the information (due to various reasons such as lack of clarity in MS4 reporting requirements, reporting of other Agency data, etc.). Recommend data gaps be addressed to provide a more accurate understanding of BMP implementation.

Meeting Notes

Draft Input Deck:

An overview was provided of the revised projection for the urban stream restoration BMP that incorporates updated values from Fairfax County, followed by an overview of the revised draft input deck (for BMP implementation on nonregulated lands). There are deficits (from the LAPGs for PDC 8) of approximately 3,000 lbs for phosphorous and approximately 9,300 lb for nitrogen. The group was asked to consider if the gap should be addressed by proposing more BMPs (i.e. work harder) or if the values provide a realistic outcome for 2025 of what the area can accomplish. Discussion was minimal with the group in agreement to leave the gap as the current level of BMP implementation is reflective of what can reasonably be achieved given there's no regulatory requirement in the nonregulated lands and no funding to support BMP implementation. It was noted that the level of effort to close the gap was approximately 15% for phosphorous and much higher for nitrogen.

It was commented upon again in this meeting the gaps in the data tracking BMPs and that this needs to be addressed. It was recommended that the localities identify data issues so that this could be brought to DEQ's attention.

Another person questioned if a MS4 grows its jurisdictional area and that new area encompasses previously unregulated land in which BMPs were implemented, do they get that credit (for their permit) back? If so, this would create more incentive for MS4s to work in unregulated areas.

Programmatic Actions:

Approximately 20 proposed Programmatic Actions for the PDC to put forward were reviewed. The recommendations were compiled from those developed by the Hampton-Roads PDC (because similar in size and urban) and a few other PDCs. The actions were organized into the following categories: SWM, Land Conservation, State Specific, BMPs and Septic. Highlighted below is some of the discussion of those proposed recommendations:

- Private BMPs: Confusion as who and how these BMPs are reported was identified. These are to be reported throught the construction permit (and the staff that oversees that), but within the same localities, there are differences in how those BMPs are tracked. Also, whether MS4s are to include these BMPs in their annual reports is unclear.
- Noted that VDOTs permit requires the Agency to consider local stormwater requirements, but not required to follow and a process ensure a locality's requirements are known to the Agency. Recommended this issue be addressed, such as through a permit condition.
- Those items listed under the Septic category were recommended to be removed due to discomfort of not having local health department staff present to offer their opinion.
- Recommendation to expand the Chesapeake Bay Program Action to the entire Bay watershed was removed as this largely does not change things for PDC 8.

Cost Estimates:

A summary of the cost estimates for Virginia, which is a statewide average based upon 2010 costs, was provided. The question for the group was if it was felt the values are reflective of costs to implement BMPs in Northern Virginia. Using the statewide averages, the total cost to implement the draft input deck (which still falls short of LAPGs) is approximately $78 million. Discussion identified that values, by looking a few key BMPs, fall short of the costs for Northern Virginia. For instance, stream restoration is a statewide average of approximately $400 per foot but in Northern Virginia, the group said it was at least $1000 per foot, at a minimum. Therefore, the group decided it was preferable to revise the costs to more realistically reflect the monetary effort associated with the proposal.

Discussion regarding how to develop revised cost estimates ended with agreement to select a few BMPs to review for what the costs would be in Northern Virginia. From those, to see if there is a trend to propose a multiplier that can be applied to develop a revised cost per BMP and total cost. This was chosen as more efficient way to develop revised cost estimates that is also justifiable. Each locality was asked to conduct this exercise and submit their information to NVRC by November 30th.

WIP 3 Meeting #4
November 19, 2018
Sign-In Sheet

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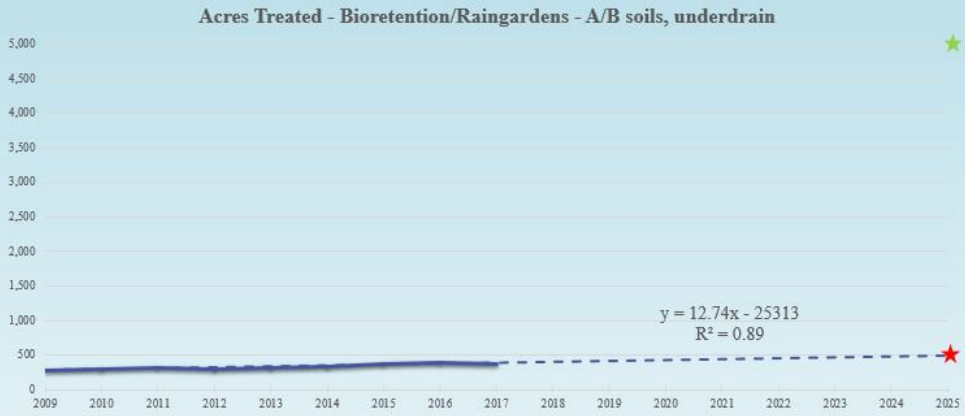
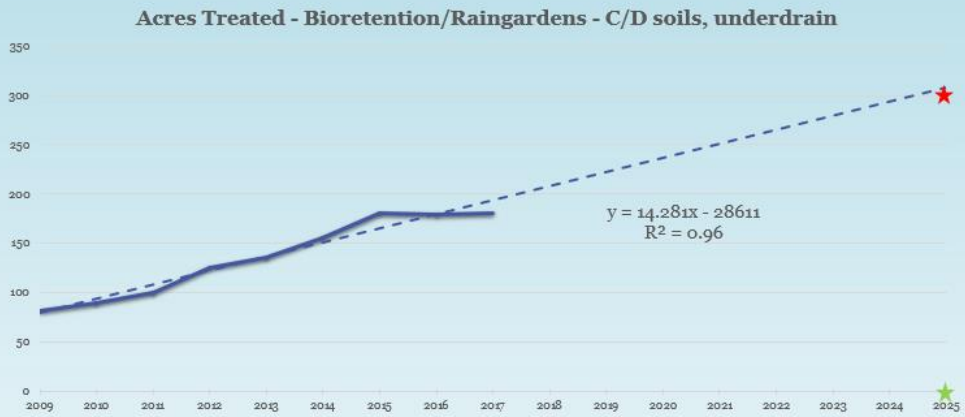
Appendix C: Individual BMP Regression Plots

Development BMPs



Development BMPs



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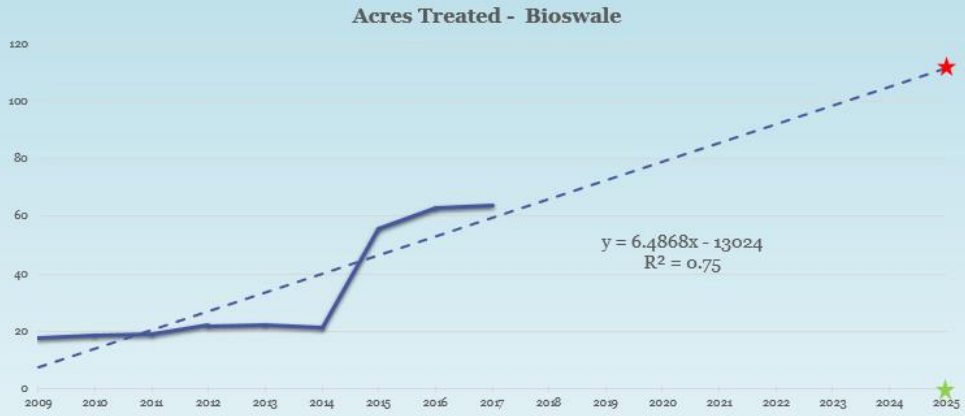

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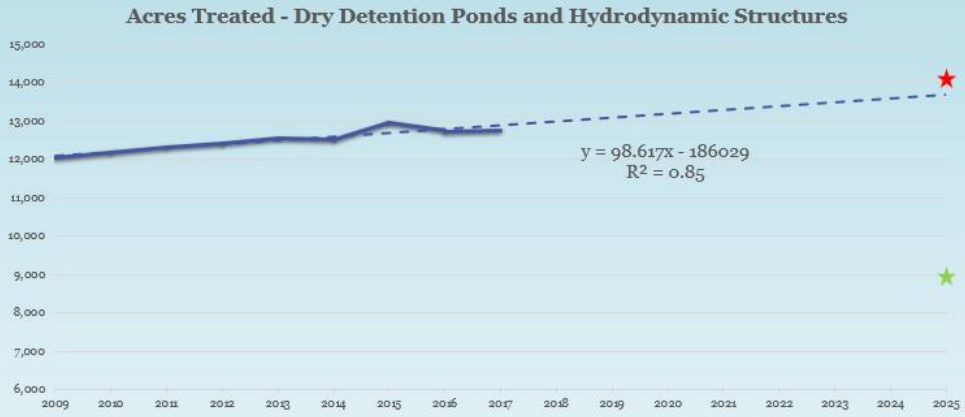

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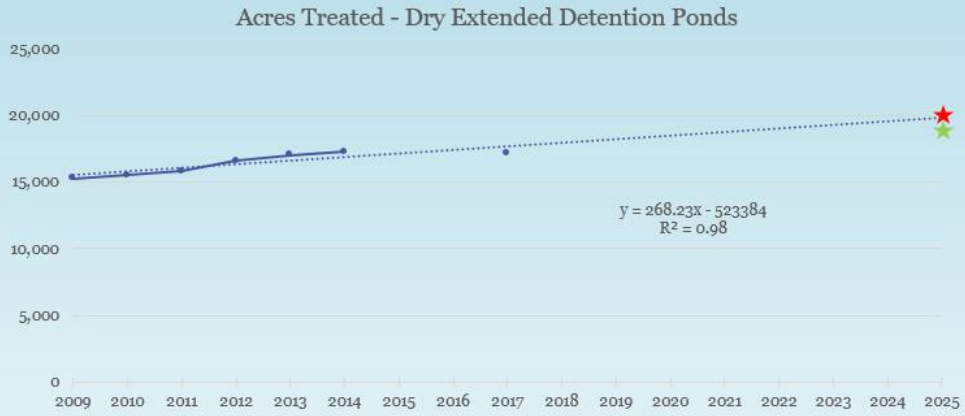

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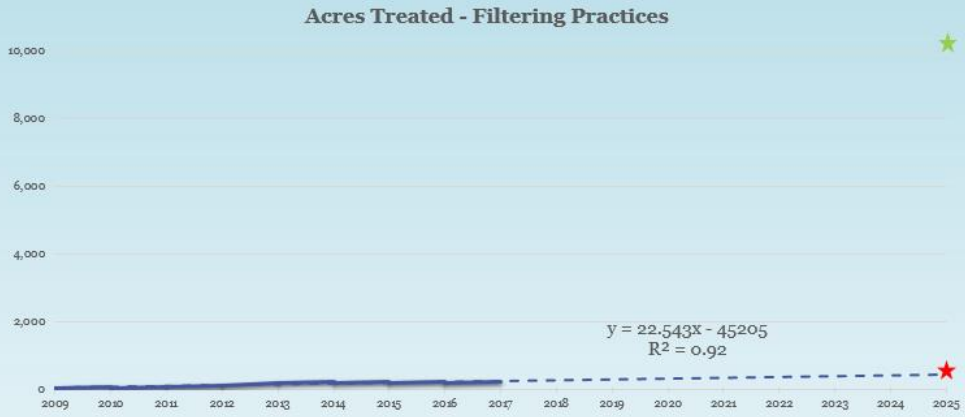

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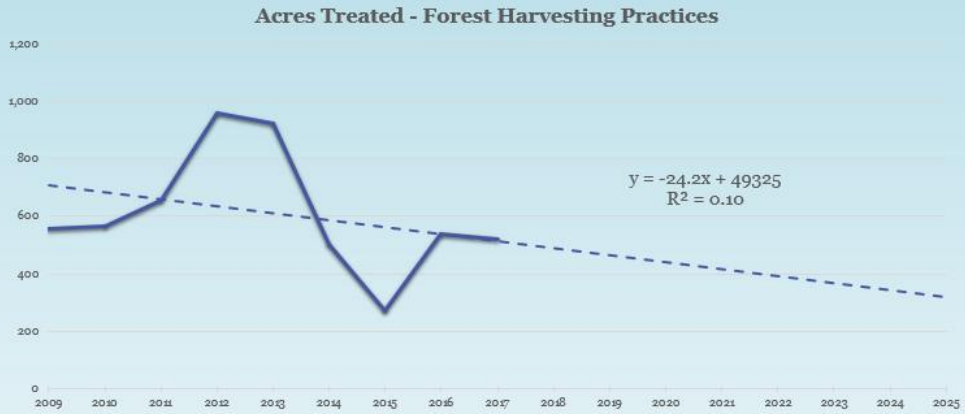

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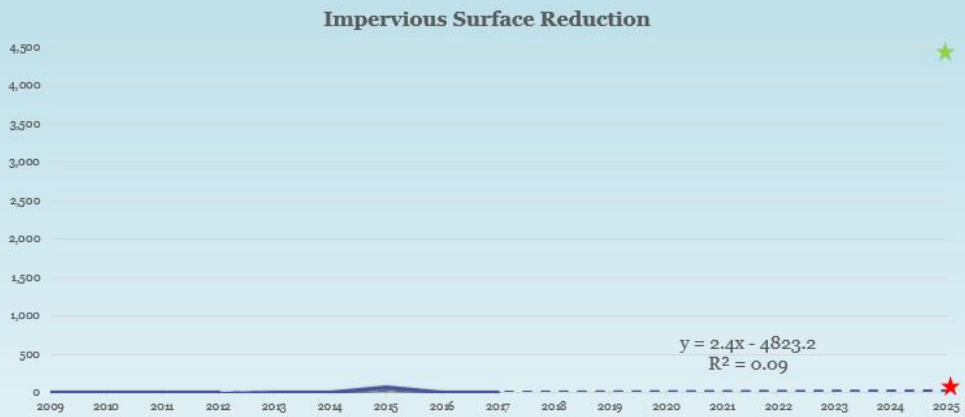
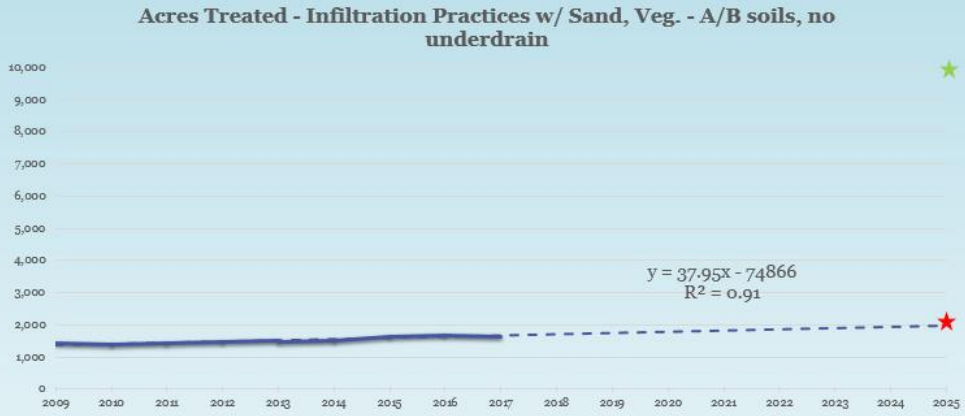


Development BMPs



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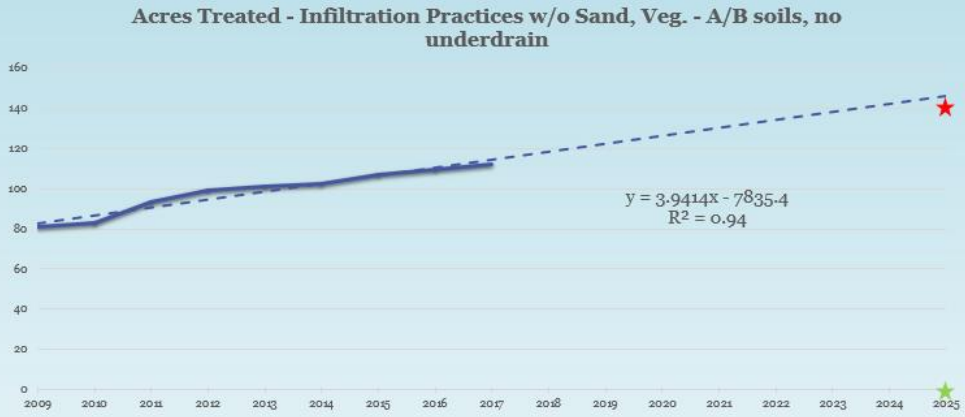

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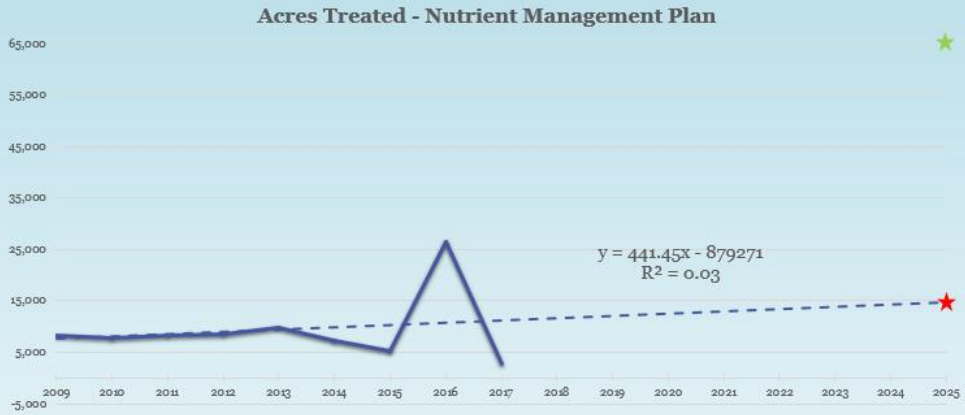

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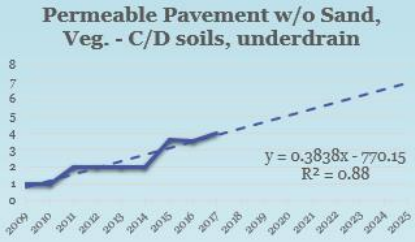
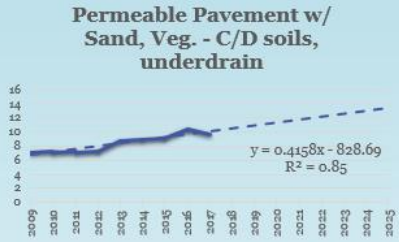
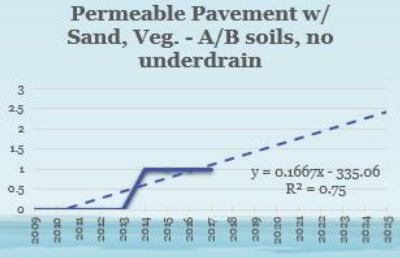
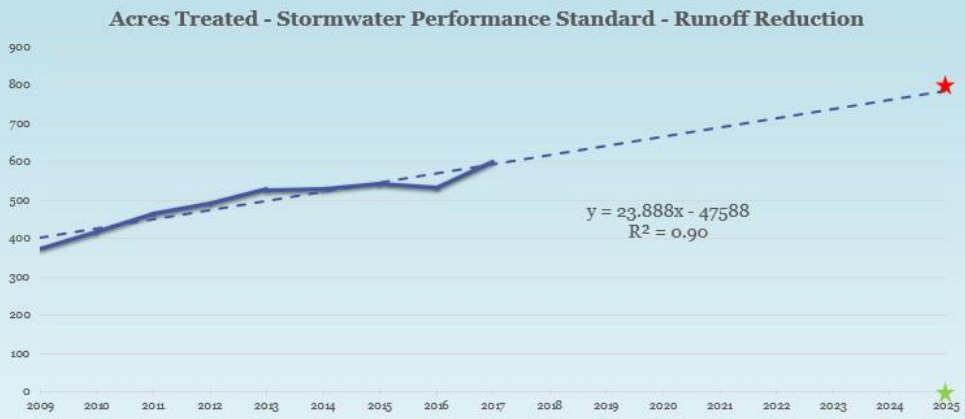






WIP II – 10 acres
WIP III – 24 acres

Development BMPs



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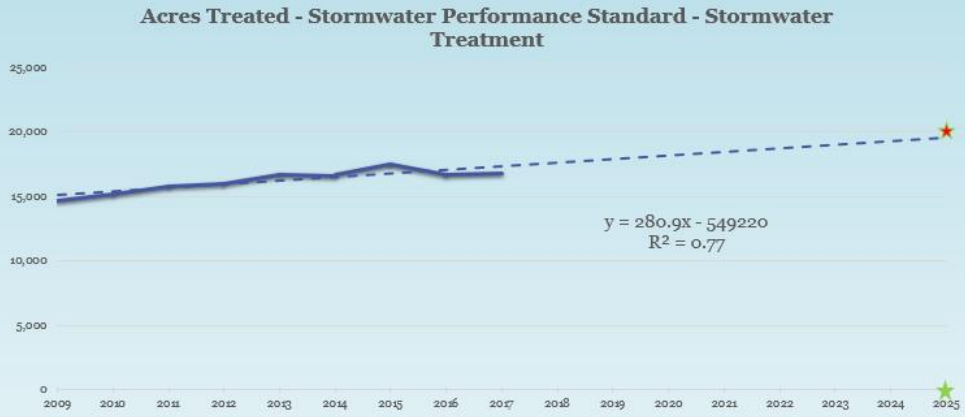

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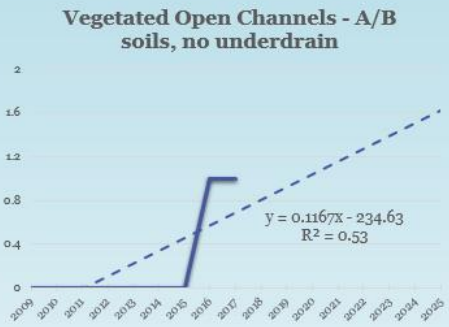

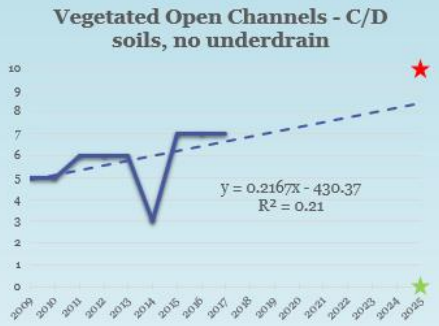

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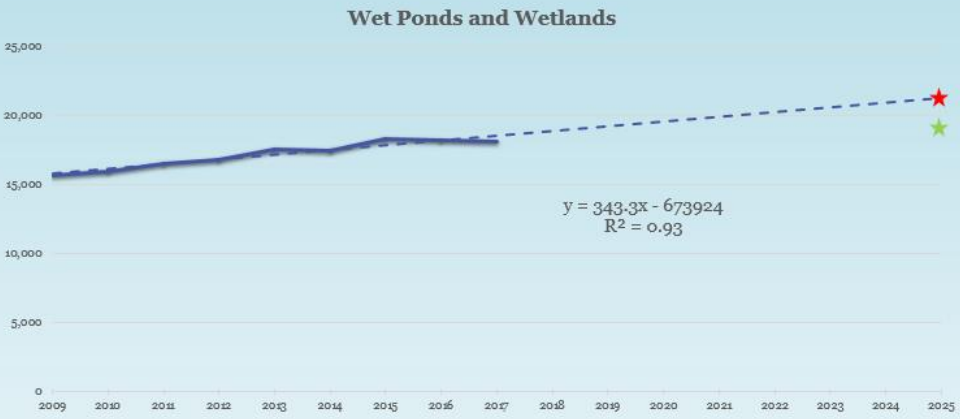
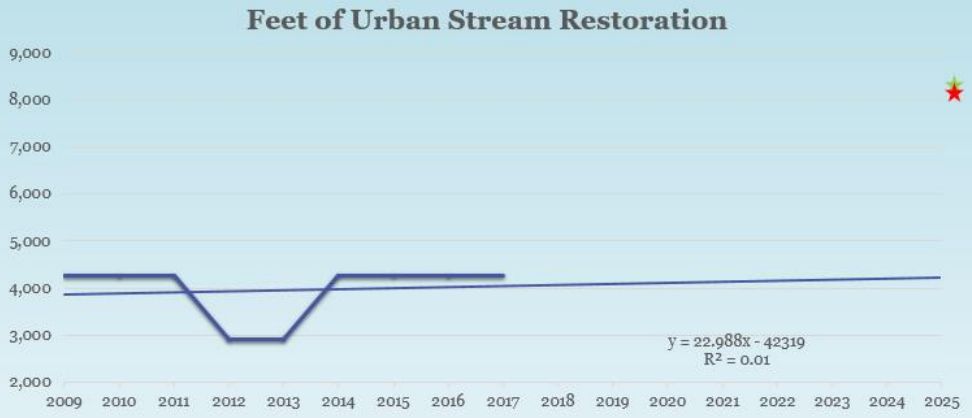
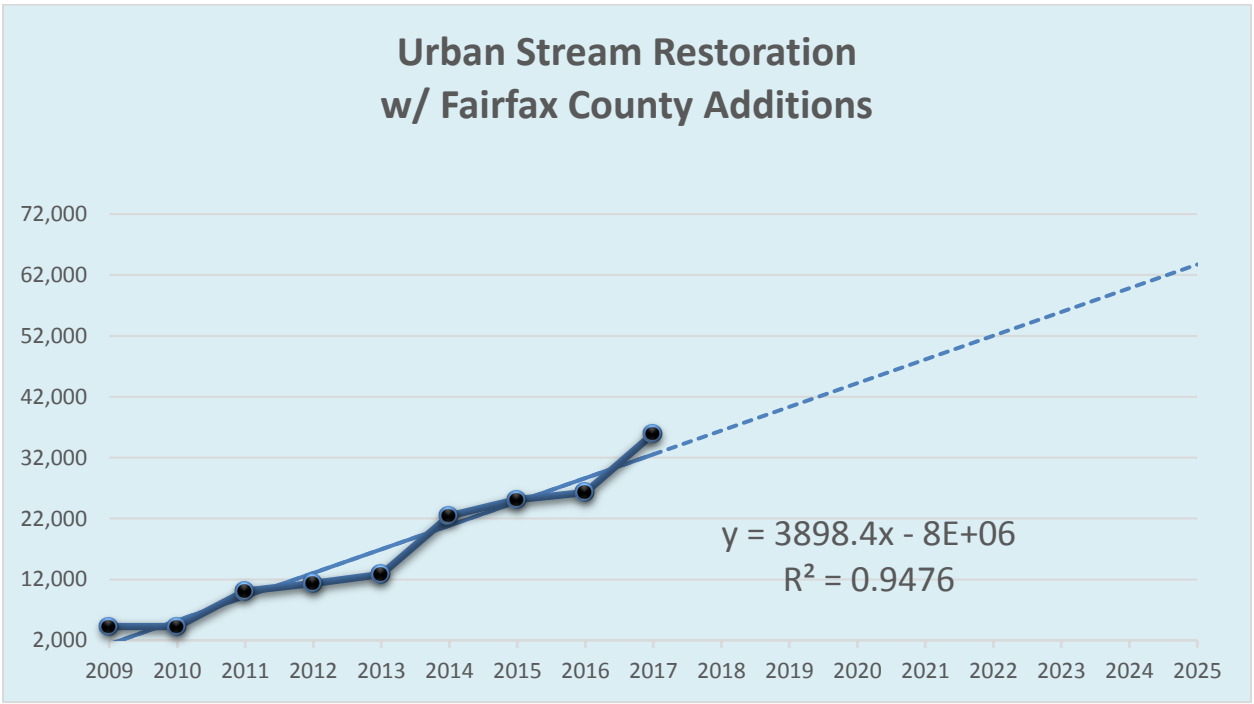


Natural BMPs





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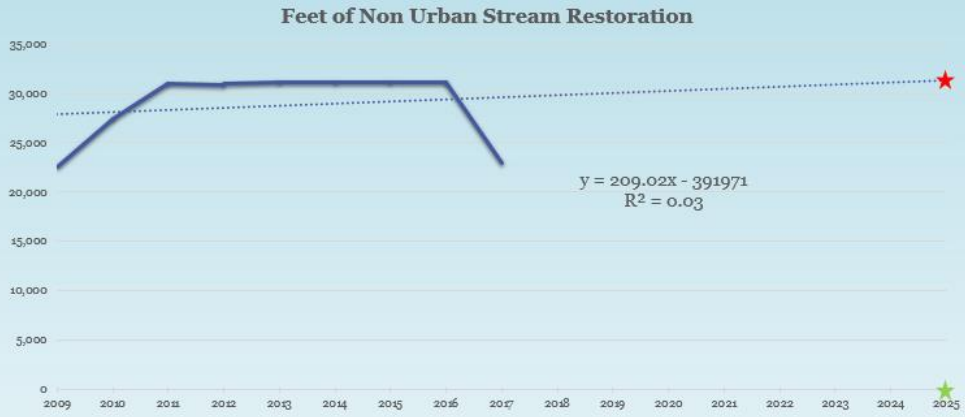
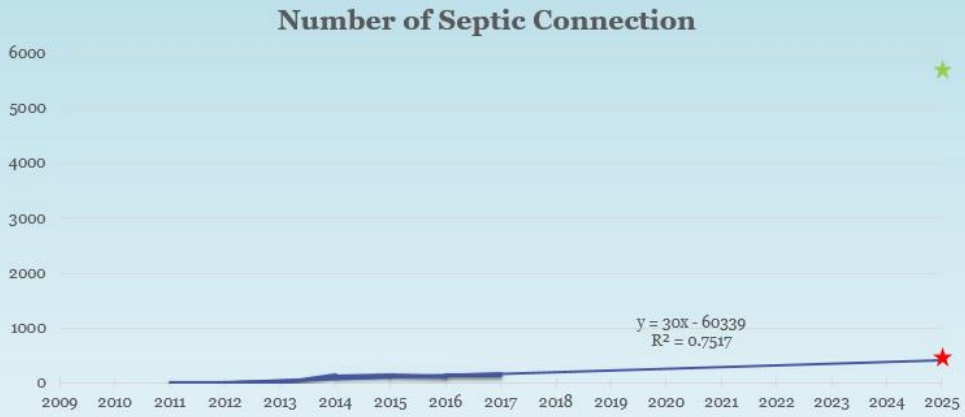


Septic BMPs



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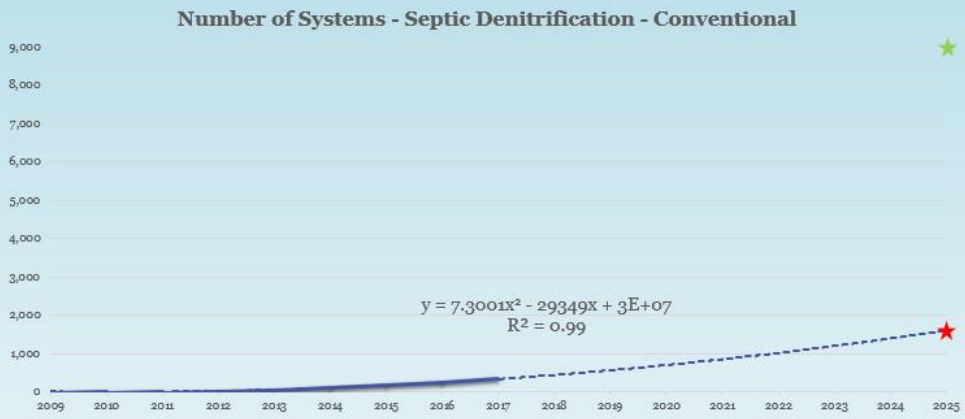

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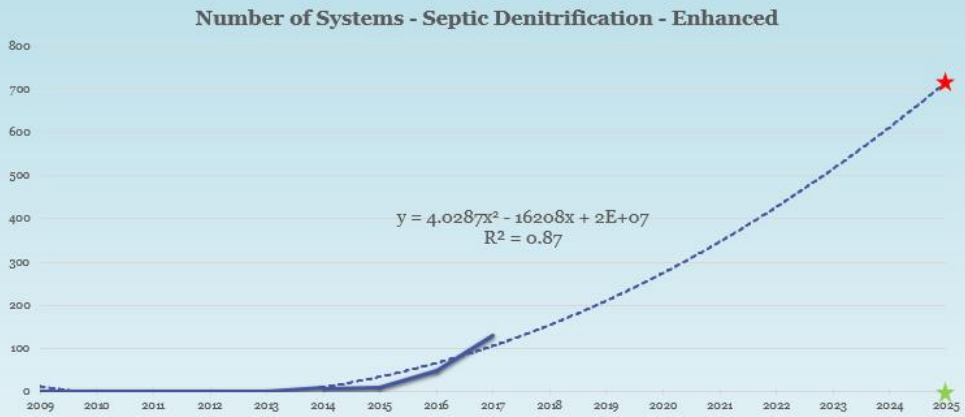

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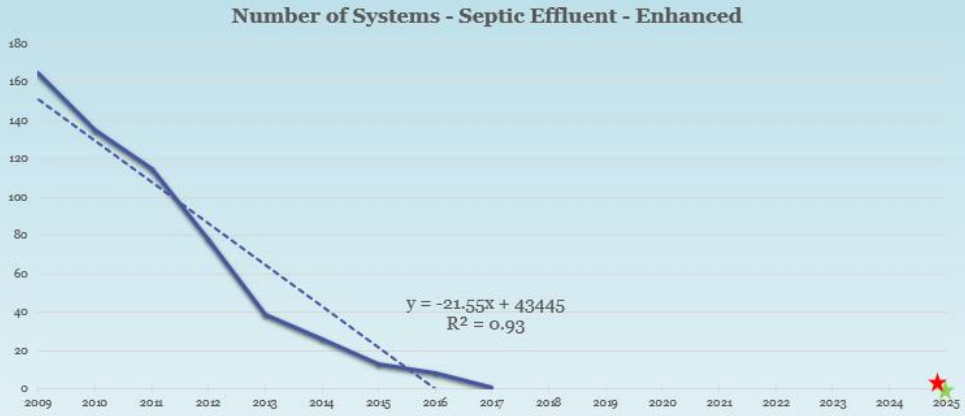

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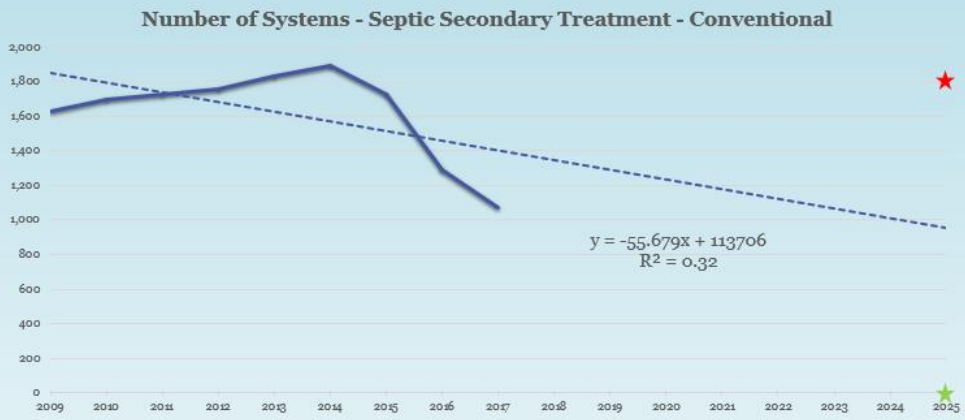

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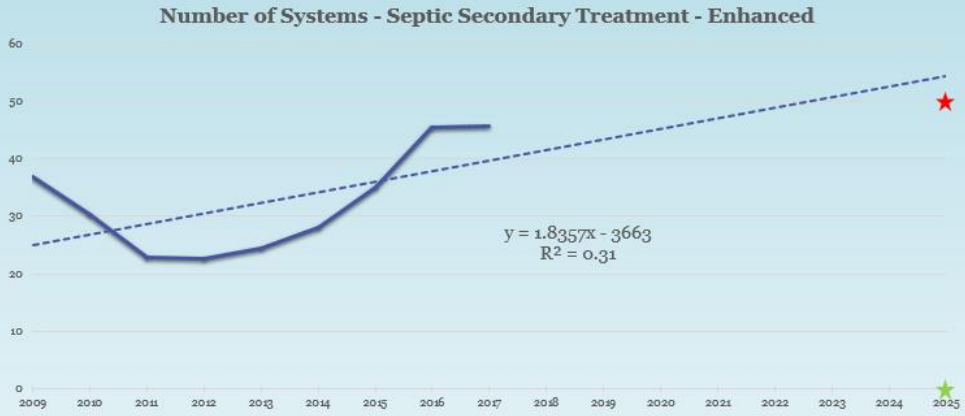
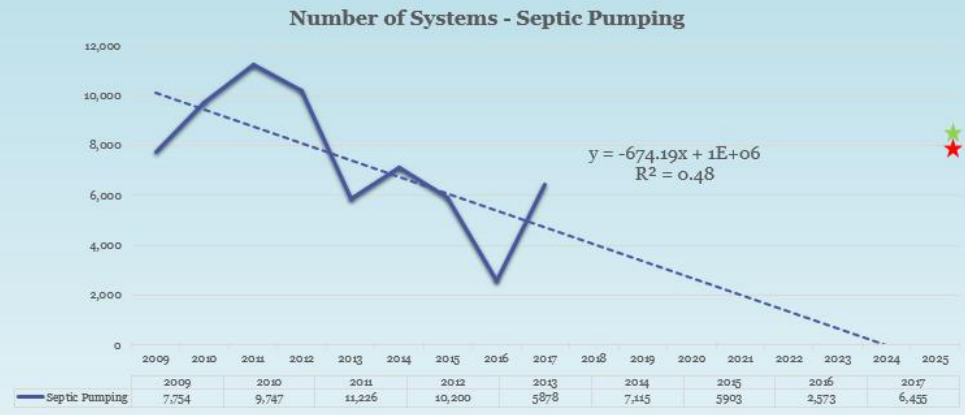


Septic BMPs



Appendix D: CAST Loading Scenarios

Phase III WIP CAST Input Deck Scenarios for Phosphorus

LAPG Loads (LBS)	Phosphorus (Edge of Tide)					
	VA Specified WIP 2	WIP II DEQ Input @ PDC Scale	PDC8 - WIP III Run 1	PDC8 - WIP III Run 1 + Septic	PDC8 - WIP III Run 1 + Septic + Natural	PDC8 - WIP III Run 2
Sector: Non-Regulated Developed						
Non-Regulated Buildings and Other	13,274	13,213	14,733	14,733	14,733	14,714
Non-Regulated Roads	6,737	6,706	7,478	7,478	7,478	7,457
Non-Regulated Tree Canopy over Impervious	2,985	2,972	3,315	3,315	3,315	3,310
Non-Regulated Tree Canopy over Turf Grass	20,490	19,338	20,093	20,093	20,093	20,069
Non-Regulated Turf Grass	69,019	65,639	67,154	67,154	67,154	66,710
Total (lbs)	112,505	107,867	112,773	112,773	112,773	112,272
LAPG Delta (lbs)			-4,906	-4,906	-4,906	-4,394
Sector: Natural						
Harvested Forest	191	191	191	191	191	191
Headwater or Isolated Wetland	270	275	275	275	275	275
Mixed Open	8,184	8,184	8,184	8,184	8,184	8,184
Non-tidal Floodplain Wetland	592	592	592	592	592	592
Shoreline	19,798	19,797	19,797	19,797	19,797	19,797
Stream Bed and Bank	100,970	102,331	103,893	103,893	103,030	100,891
True Forest	9,243	9,156	9,139	9,139	9,139	9,156
Water	5,253	5,253	5,253	5,253	5,253	5,253
Total (lbs)	144,502	145,779	147,324	147,324	146,461	144,339
LAPG Delta (lbs)			-1,545	-1,545	-682	+1,440
Grand Total (lbs)	257,007	253,645	260,097	260,097	259,234	258,588
LAPG Delta (lbs)			-6,451	-6,451	-5,589	-2,954

Phase III WIP CAST Input Deck Scenarios for Nitrogen

LAPG Loads	Nitrogen (Edge of Tide)1260					
	VA Specified WIP 2	WIP II DEQ Input @ PDC Scale	PDC8 - WIP III Run 1	PDC8 - WIP III Run 1 + Septic	PDC8 - WIP III Run 1 + Septic + Natural	PDC8 - WIP III Run 2
Sector: Non-Regulated Developed (45%)						
Non-Regulated Buildings and Other	186,054	185,287	207,404	207,404	207,404	207,268
Non-Regulated Roads	99,740	99,329	111,184	111,184	111,184	111,104
Non-Regulated Tree Canopy over Impervious	50,579	50,370	56,398	56,398	56,398	56,359
Non-Regulated Tree Canopy over Turf Grass	102,913	99,258	104,887	104,887	104,887	104,819
Non-Regulated Turf Grass	330,365	319,796	335,224	335,224	335,224	333,232
Total (lbs)	769,651	754,039	815,098	815,098	815,098	812,726
LAPG Delta (lbs)			-61,059	-61,059	-61,059	-58,686
Sector: Natural (40%)						
Harvested Forest	8,930	8,930	8,930	8,930	8,930	8,930
Headwater or Isolated Wetland	3,210	3,300	3,300	3,300	3,300	3,300
Mixed Open	38,526	38,526	38,526	38,526	38,526	38,526
Non-tidal Floodplain Wetland	8,592	8,592	8,592	8,592	8,592	8,592
Shoreline	28,007	28,006	28,006	28,006	28,006	28,006
Stream Bed and Bank	359,941	369,777	376,912	380,495	379,339	376,425
True Forest	162,971	161,386	161,106	161,106	161,106	161,385
Water	70,103	70,103	70,103	70,103	70,103	70,103
Total (lbs)	680,280	688,621	695,475	699,058	697,902	695,267
LAPG Delta (lbs)	0.1429		-6,854	-10,437	-9,281	-6,646
Sector: Septic (14%)						
Rapid Infiltration Basin	558	558	558	558	558	558
Septic	241,218	241,218	241,218	269,373	269,373	269,373
Total (lbs)	241,777	241,777	241,777	269,932	269,932	269,932
Grand Total (lbs)	1,691,708	1,684,437	1,752,350	1,784,088	1,782,932	1,780,631
LAPG Delta (lbs)			-67,913	-99,651	-98,495	-93,488