DEQ Virginia Runoff Reduction Method Re-Development Compliance Spreadsheet - **Version 3.0**

○ 2011 BMP Standards and Specifications | ⊙ 2013 Draft BMP Standards and Specifications

Project Name:	11th & Danville Park Renovation
Date:	105/11/2021
Linear Development Project?	Yes

CLEAR ALL (Ctrl+Shift+R)

data input cells | constant values | calculation cells | final results

Site Information

Post-Development Project (Treatment Volume and Loads)

Enter Total Disturbed Area *(acres)* → 0.3212

Maximum reduction required:	*20%*
The site's net increase in impervious cover (acres) is:	*0.0058*
Post-Development TP Load Reduction for Site (lb/yr):	*0.0714*

Check:
BMP Design Specifications List: 2013 Draft Stds & Specs
Linear project? Yes
Land cover areas entered correctly? ✔
Total disturbed area entered? ✔

Pre-ReDevelopment Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed forest/open space					0.0000
Managed Turf (acres) -- disturbed, graded for yards or other turf to be			0.2325		0.2325
Impervious Cover (acres)			0.0887		0.0887
					0.3212

Post-Development Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested					0.0000
Managed Turf (acres) -- disturbed, graded for yards or other turf to be			0.2267		0.2267
Impervious Cover (acres)			0.0945		0.0945
Area Check	OK.	OK.	OK.	OK.	0.3212

Constants

Annual Rainfall (inches)	43
Target Rainfall Event (inches)	1.00
Total Phosphorus (TP) EMC (mg/L)	0.26
Total Nitrogen (TN) EMC (mg/L)	1.86
Target TP Load (lb/acre/yr)	0.41
Pj (unitless correction factor)	0.90

Runoff Coefficients (Rv)

	A Soils	B Soils	C Soils	D Soils
Forest/Open Space	0.02	0.03	0.04	0.05
Managed Turf	0.15	0.20	0.22	0.25
Impervious Cover	0.95	0.95	0.95	0.95

LAND COVER SUMMARY -- PRE-REDEVELOPMENT

Land Cover Summary-Pre

Pre-ReDevelopment	Listed	Adjusted[1]
Forest/Open Space Cover (acres)	0.0000	0.0000
Weighted Rv(forest)	0.0000	0.0000
% Forest	0%	0%
Managed Turf Cover (acres)	0.2325	0.2267
Weighted Rv(turf)	0.2200	0.2200
% Managed Turf	72%	72%
Impervious Cover (acres)	0.0887	0.0887
Rv(impervious)	0.9500	0.9500
% Impervious	28%	28%
Total Site Area (acres)	**0.3212**	**0.3154**
Site Rv	**0.4216**	**0.4253**

Treatment Volume and Nutrient Load

Pre-ReDevelopment Treatment Volume (acre-ft)	0.0113	0.0112
Pre-ReDevelopment Treatment Volume (cubic feet)	491.5565	486.9246
Pre-ReDevelopment TP Load (lb/yr)	**0.3088**	**0.3059**
Pre-ReDevelopment TP load per acre (lb/acre/yr)	0.9600	0.9700
Baseline TP Load (lb/yr) (**0.41 lbs/acre/yr** applied to pre-redevelopment area excluding pervious land proposed for new impervious cover)		*0.1293*

[1] *Adjusted Land Cover Summary:*
Pre ReDevelopment land cover minus pervious land cover (forest/open space or managed turf) acreage proposed for new impervious cover.

Adjusted total acreage is consistent with Post-ReDevelopment acreage (minus acreage of new impervious cover).

Column I shows load reduction requirement for new impervious cover (based on new development load limit, 0.41 lbs/acre/year).

LAND COVER SUMMARY -- POST DEVELOPMENT

Land Cover Summary-Post (Final)

Post ReDev. & New Impervious	
Forest/Open Space Cover (acres)	0.0000
Weighted Rv(forest)	0.0000
% Forest	0%
Managed Turf Cover (acres)	0.2267
Weighted Rv (turf)	0.2200
% Managed Turf	71%
Impervious Cover (acres)	0.0945
Rv(impervious)	0.9500
% Impervious	29%
Final Site Area (acres)	**0.3212**
Final Post Dev Site Rv	**0.4348**

Land Cover Summary-Post

Post-ReDevelopment	
Forest/Open Space Cover (acres)	0.0000
Weighted Rv(forest)	0.0000
% Forest	0%
Managed Turf Cover (acres)	0.2267
Weighted Rv (turf)	0.2200
% Managed Turf	72%
ReDev. Impervious Cover (acres)	0.0887
Rv(impervious)	0.9500
% Impervious	28%
Total ReDev. Site Area (acres)	**0.3154**
ReDev Site Rv	**0.4253**

Land Cover Summary-Post

Post-Development New Impervious	
New Impervious Cover (acres)	0.0058
Rv(impervious)	0.9500

Treatment Volume and Nutrient Load

Final Post-Development Treatment Volume (acre-ft)	0.0116
Final Post-Development Treatment Volume (cubic feet)	506.9259
Final Post-Development TP Load (lb/yr)	**0.3185**
Final Post-Development TP Load per acre (lb/acre/yr)	0.9900

Post-ReDevelopment Treatment Volume (acre-ft)	0.0112
Post-ReDevelopment Treatment Volume (cubic feet)	486.9246
Post-ReDevelopment Load (TP) (lb/yr)*	**0.3059**
Post-ReDevelopment TP Load per acre (lb/acre/yr)	0.9700
Max. Reduction Required (Below Pre-ReDevelopment Load)	**20%**
TP Load Reduction Required for Redeveloped Area (lb/yr)	**0.0612**

Post-Development Treatment Volume (acre-ft)	0.0005
Post-Development Treatment Volume (cubic feet)	20.0013
Post-Development TP Load (lb/yr)	**0.0126**
TP Load Reduction Required for New Impervious Area (lb/yr)	**0.0102**

Post-Development Requirement for Site Area

TP Load Reduction Required (lb/yr)	**0.0714**
Linear Project TP Load Reduction Required (lb/yr):	**0.0714**

Site Information - Revised 9/19/2017

Project SWM #	LDA Permit #	Disturbed Area (acres)	% Pre-Impervious	% Post-Impervious	Pre-Development TP load (lb/yr)	Post-Development TP load (lb/yr)	TP load reduction achieved (lb/yr)	Pre-Development TN load (lb/yr)	Post-Development TN load (lb/yr)	TN load reduction achieved (lb/yr)	Total Site Area (acres)	Pre-Forest Area (acres)	Pre-Turf Area (acres)	Pre-Impervious Area (acres)	Post-Forest Area (acres)	Post-Turf Area (acres)	Post-Impervious Area (acres)	Pre-Runoff Volume	Post-Runoff Volume	Runoff Volume Reducation Achieved	Site Latitude (Decimal Degrees)	Site Longitude (Decimal Degrees)	Anticipated Start Date
22-0028	LDA22032	0.3212	27.6	29.4	0.31	0.32	–	2.21	2.28	0.00	0.3212	0.0000	0.2325	0.0887	0.0000	0.2267	0.0945	491.5565	506.9259	0.0000	38.886585	-77.091134	TBD

WATER QUALITY NARRATIVE

The pathways through the park provide pedestrian access from surrounding residences to Clarendon retail and business uses to the north as well as to the Clarendon Metro Station. These proposed improvements will upgrade the existing paths to make pedestrian access ADA compliant and provide lighting interior to the site to promote safety for pedestrian traffic. There are two existing bioretention facilities already serving the site.

The proposed improvements are linear upgrades. creating more disturbance to provide additional stormwater management facilites would be counter-productive and potentially harm established vegetation. For these reasons, and per discussion with Qianqian Li (DES) on 11/19/2021, this project should be considered a linear transportation project and exempt from providing water quality controls.

NOTE:The Runoff Reduction Spreadsheet information on this plan is for data tracking purposes to document the area of land disturbance and to characterize pre- and post-development land use conditions.

In accordance with Arlington County's Chesapeake Bay Total Maximum Daily Load (TMDL) Action Plan, approved by the Virginia Department of Environmental Quality (DEQ) on September 1, 2015, linear development projects conducted by the County are administered and tracked as follows consistent with 9VAC25-870-69.A.4, 9VAC25-870-76, and 9VAC25-870-92:

- Pollutant load changes will be computed as described in Section 3.A of the Action Plan.
- Retrofit opportunities will be evaluated for each project, using the screening and selection criteria applied and described in the adopted Stormwater Master Plan.
- Retrofit projects that meet the screening criteria and are determined by Arlington to be feasible and cost-effective will be implemented with specific linear development projects. Pollutant load reductions from retrofit projects will be computed as described in Section 5 of the Action Plan.
- In cases where retrofit projects are not feasible and cost-effective for a particular linear project, any pollutant of concern (POC) load increases that might occur for that project will be addressed by larger overall POC load reductions in place or added through TMDL action plan implementation.

In the above manner Arlington, as the MS4 operator and the construction site operator for its linear development projects, implements linear projects and retrofit projects in a manner that achieves the most TMDL POC reduction for the least cost, while fully accounting for load changes that occur with linear development project activity consistent with the DEQ Chesapeake Bay TMDL Special Condition Guidance.

WATER QUANTITY NARRATIVE

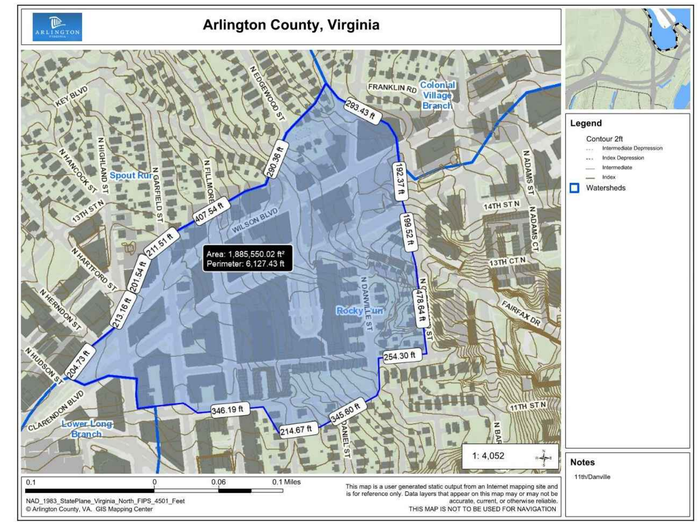
PER THE ARLINGTON COUNTY CODE, CHAPTER 60, THE DEVELOPED SITE SHALL ADDRESS CHANNEL PROTECTION AND FLOOD PROTECTION IN ACCORDANCE WITH VIRGINIA STORMWATER MANAGEMENT CODE 9VAC25-870-66. PER 9VAC25-870-66(B)(1)(a), THE SITE'S DISCHARGE TO A MANMADE STORMWATER CONVEYANCE SYSTEM SHALL BE CONVEYED IN A NON-EROSIVE MANNER FOR THE TWO-YEAR 24-HOUR STORM EVENT. PER 9VAC25-870-66(4)(a), THE LIMITS OF ANALYSIS, BASED ON LAND AREA, SHALL BE TO A POINT WHERE THE SITE'S CONTRIBUTING DRAINAGE AREA IS LESS THAN 1% OF THE TOTAL WATERSHED AREA. THE SITE IS WITHIN THE ROCKY RUN WATERSHED WHICH HAS A TOTAL AREA OF 474.3 ACRES. THE SITE'S LIMITS OF DISTURBANCE IS 0.3212 ACRES AND SITS IN THE UPPER PORTION OF THE ROCKY RUN WATERSHED. DOWNSTREAM OF THE SITE AT APPROXIMATELY THE INTERSECTION OF N CLEVELAND STREET AND FAIRFAX DRIVE, THE TOTAL CONTRIBUTING WATERSHED AREA IS 43.3 ACRES WHICH IS THE POINT WHERE THE SITE'S CONTRIBUTING DRAINAGE AREA IS LESS THAN 1% OF THE TOTAL CONTRIBUTING WATERSHED AREA, SEE MAP ON THIS SHEET. THE STORM SYSTEM AT THE LIMITS OF ANALYSIS IS A PIPED SYSTEM WITH NO APPARENT EROSION FROM THE TWO-YEAR 24-HOUR STORM EVENT. THEREFORE, CHANNEL PROTECTION IS ADDRESSED.

PER THE ARLINGTON COUNTY CODE, CHAPTER 60, THE DEVELOPED SITE SHALL ADDRESS FLOOD PROTECTION FOR THE 10-YEAR 24-HOUR STORM EVENT UTILIZING THE ENERGY BALANCE METHOD. UTILIZING ARLINGTON COUNTY'S ENERGY BALANCE SPREADSHEET, PRE- AND POST-DEVELOPMENT RUNOFF COMPUTATIONS FOR THE SITE WERE DEVELOPED TO ESTABLISH AN ALLOWABLE RELEASE RATES FOR THE 10-YEAR, 24-HOUR STORM EVENT OF 1.13 CFS. FOR THE 10-YEAR STORM EVENT THE POST-DEVELOPED PEAK FLOW IS EQUAL TO THE ALLOWABLE RELEASE RATE, THEREFORE THERE IS NO STORAGE IS REQUIRED FOR THE 10-YEAR STORM AS SHOWN IN THE ENERGY BALANCE WORKSHEET. THEREFORE THIS DEVELOPMENT SATISFIES THE FLOOD PROTECTION REQUIREMENT FOR THE 10-YR STORM EVENT.

IT IS THE ENGINEER'S OPINION THAT THE IMPROVEMENTS PROPOSED WITH THIS APPLICATION WILL HAVE NO ADVERSE IMPACT TO THE ADJACENT PROPERTIES.

PER FEMA FLOODPLAIN MAP 51013C0039C, DATED AUGUST 19, 2013, THIS SITE IS OUTSIDE OF THE FLOODPLAIN.

PER ARLINGTON COUNTY GIS, NO RPA IS PRESENT.



SWM Water Quantity Energy Balance Worksheet

SITE AREA (acre) 0.3212

	1-year		10-year	
	PRE	POST (adjusted)	PRE	POST (adjusted)
P	2.60	2.60	4.83	4.83
CN	81	81	81	81
S=1000/CN-10	2.35	2.35	2.35	2.35
0.2S	0.47	0.47	0.47	0.47
$RV=(P-0.2S)^2/(P-0.2S)+S$	1.01	1.01	2.84	2.84

QPost Development <= I.F.* (Qpre-development* RVpre-development)/RVDeveloped)

I.F 0.9

CHANNEL PROTECTION		
Qpre-development	0.41	From TR55
QPost Development	0.41	From TR55
RVPost Development (with runoff reduction)	1.0143	From RRM
Qallowable	0.37	

FLOOD CONTROL	
Qpre-development	1.13
QPost Development	1.13
RVPost Development (with runoff reduction)	2.8356
Qallowable	1.13

Qallowable/QPost Development	0.90	Fig 11.7 of DEQ Manual
Vs/Vr	0.15	
Vs	0.15	
Storage required (cf)	177	

Qallowable/QPost Development	1.00
Vs/Vr	0.00
Vs	0.00
Storage required (cf)	0

ARLINGTON VIRGINIA

DEPARTMENT OF PARKS AND RECREATION

Park Development Division
2100 Clarendon Boulevard, Suite 414
Arlington, VA 22201
Phone: 703.228.3332
Fax: 703.228.3328

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Project Name and Location

11th & Danville Public Space Improvements

2751 11th Street North
Arlington, VA 22201

Sheet Title

STORMWATER MANAGEMENT NARRATIVE & CALCULATIONS

Approval Date

Design Manager

Revisions Date

Designed: AW
Drawn: AMT
Checked: CMB
Filename: C-13-210330.001 SWM MANAGEMENT NARRATIVE & CALCULATIONS
Plotted: 2022-05-12

Scale: N/A
Date: MAY 12, 2022

Seal

COMMONWEALTH OF VIRGINIA
CHELSEA M. BISHOP
Lic. No. 50030
Chelsea Bishop
MAY 12, 2022

Sheet

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