Project Name: **1212 SOUTH IRVING STREET**
Date: **3/22/2021**
Linear Development Project? No

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)* → 0.3425

Maximum reduction required:	*10%*
The site's net increase in impervious cover (acres) is:	*0.0483*
Post-Development TP Load Reduction for Site (lb/yr):	*0.1188*

Check:
BMP Design Specifications List: 2013 Draft Stds & Specs
Linear project? No
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			0.2274		0.2274
Impervious Cover (acres)			0.1152		0.1152
					0.3425

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			0.1791		0.1791
Impervious Cover (acres)			0.1635		0.1635
Area Check	OK.	OK.	OK.	OK.	0.3425

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)	0.2274	0.1791
Weighted Rv(turf)	0.2200	0.2200
% Managed Turf	66%	61%
Impervious Cover (acres)	0.1152	0.1152
Rv(impervious)	0.9500	0.9500
% Impervious	34%	39%
Total Site Area (acres)	**0.3425**	**0.2942**
Site Rv	**0.4654**	**0.5057**

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)	0.1791
Weighted Rv (turf)	0.2200
% Managed Turf	52%
Impervious Cover (acres)	0.1635
Rv(impervious)	0.9500
% Impervious	48%
Final Site Area (acres)	**0.3425**
Final Post Dev Site Rv	**0.5683**

Land Cover Summary-Post	
Post-ReDevelopment	
Forest/Open Space Cover (acres)	0.0000
Weighted Rv(forest)	0.0000
% Forest	0%
Managed Turf Cover (acres)	0.1791
Weighted Rv (turf)	0.2200
% Managed Turf	61%
ReDev. Impervious Cover (acres)	0.1152
Rv(impervious)	0.9500
% Impervious	39%
Total ReDev. Site Area (acres)	**0.2942**
ReDev Site Rv	**0.5057**

Land Cover Summary-Post	
Post-Development New Impervious	
New Impervious Cover (acres)	0.0483
Rv(impervious)	0.9500

Treatment Volume and Nutrient Load

Pre-ReDevelopment Treatment Volume (acre-ft)	0.0133	0.0124
Pre-ReDevelopment Treatment Volume (cubic feet)	578.6917	540.1183
Pre-ReDevelopment TP Load (lb/yr)	**0.3636**	**0.3394**
Pre-ReDevelopment TP load per acre (lb/acre/yr)	1.0600	1.1500
Baseline TP Load (lb/yr) (0.41 lbs/acre/yr applied to pre-redevelopment area excluding pervious land proposed for new impervious cover)	*0.1206*	

Treatment Volume and Nutrient Load

Final Post-Development Treatment Volume (acre-ft)	0.0162	
Final Post-Development Treatment Volume (cubic feet)	706.6850	
Final Post-Development TP Load (lb/yr)	**0.4440**	
Final Post-Development TP load per acre (lb/acre/yr)	1.3000	

Treatment Volume and Nutrient Load

Post-ReDevelopment Treatment Volume (acre-ft)	0.0124	
Post-ReDevelopment Treatment Volume (cubic feet)	540.1183	
Post-ReDevelopment Load (TP) (lb/yr)*	**0.3394**	
Post-ReDevelopment TP load per acre (lb/acre/yr)	1.1500	
Max. Reduction Required (Below Pre-ReDevelopment Load)	**10%**	
TP Load Reduction Required for Redeveloped Area (lb/yr)	**0.0339**	

Post-Development Treatment Volume (acre-ft)	0.0038
Post-Development Treatment Volume (cubic feet)	166.5667
Post-Development TP Load (lb/yr)	**0.1047**
TP Load Reduction Required for New Impervious Area (lb/yr)	**0.0848**

[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).

Post-Development Requirement for Site Area

TP Load Reduction Required (lb/yr)	**0.1188**

Nitrogen Loads (Informational Purposes Only)

Pre-ReDevelopment TN Load (lb/yr)	2.6011
Final Post-Development TN Load (Post-ReDevelopment & New Impervious) (lb/yr)	3.1764

Drainage Area A

Drainage Area A Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv
Forest/Open Space (acres)					0.0000	0.0000
Managed Turf (acres)			0.0671		0.0671	0.2200
Impervious Cover (acres)			0.0776		0.0776	0.9500
				Total	0.1447	

CLEAR BMP AREAS

Total Phosphorus Available for Removal in D.A. A (lb/yr) 0.2018
Post Development Treatment Volume in D.A. A (ft³) 321.1108

Drainage Area B

Drainage Area A Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv
Forest/Open Space (acres)					0.0000	0.0000
Managed Turf (acres)			0.0847		0.0847	0.2200
Impervious Cover (acres)			0.0842		0.0842	0.9500
				Total	0.1689	

CLEAR BMP AREAS

Total Phosphorus Available for Removal in D.A. B (lb/yr) 0.2249
Post Development Treatment Volume in D.A. B (ft³) 357.9358

Stormwater Best Management Practices (RR = Runoff Reduction)

--Select from dropdown lists--

Practice	Runoff Reduction Credit (%)	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	Volume from Upstream Practice (ft³)	Runoff Reduction (ft³)	Remaining Runoff Volume (ft³)	Total BMP Treatment Volume (ft³)	Phosphorus Removal Efficiency (%)	Phosphorus Load from Upstream Practices (lb)	Untreated Phosphorus Load to Practice (lb)	Phosphorus Removed By Practice (lb)	Remaining Phosphorus Load (lb)	Downstream Practice to be Employed
6. Bioretention (RR)													
6.a. Bioretention #1 or Micro-Bioretention #1 or Urban Bioretention (Spec #9)	40	0.0689	0.0842	0.0000	138.1363	207.2045	345.3408	25	0.0000	0.2167	0.1192	0.0975	

	Nitrogen Removal Efficiency (%)	Nitrogen Load from Upstream Practices (lbs)	Untreated Nitrogen Load to Practice (lbs)	Nitrogen Removed By Practice (lbs)	Remaining Nitrogen Load (lbs)
6. Bioretention (RR)					
	40	0.0000	1.5505	0.9923	0.5582

Drainage Area C

Drainage Area A Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv
Forest/Open Space (acres)					0.0000	0.0000
Managed Turf (acres)			0.0273		0.0273	0.2200
Impervious Cover (acres)			0.0017		0.0017	0.9500
				Total	0.0290	

CLEAR BMP AREAS

Total Phosphorus Available for Removal in D.A. C (lb/yr) 0.0174
Post Development Treatment Volume in D.A. C (ft³) 27.6383

Runoff Volume and Curve Number Calculations

Enter design storm rainfall depths (in):

1-year storm	2-year storm	10-year storm
2.69	3.18	4.84

Use NOAA Atlas 14 (http://hdsc.nws.noaa.gov/hdsc/pfds/)

***Notes (see below):**

[1] The curve numbers and runoff volumes computed in this spreadsheet for each drainage area are limited in their applicability for determining and demonstrating compliance with water quantity requirements. See VRRM User's Guide and Documentation for additional information.

[2] Runoff Volume (RV) for pre- and post-development drainage areas must be in volumetric units (e.g., acre-feet or cubic feet) when using the Energy Balance Equation. Runoff measured in watershed-inches and shown in the spreadsheet as RV(watershed-inch) can only be used in the Energy Balance Equation when the pre- and post-development drainage areas are equal. Otherwise RV(watershed-inch) must be multiplied by the drainage area.

[3] Adjusted CNs are based on runoff reduction volumes as calculated in D.A. tabs. An alternative CN adjustment calculation for Vegetated Roofs is included in BMP specification No. 5.

Drainage Area Curve Numbers and Runoff Depths*

Curve numbers (CN, CNadj) and runoff depths ($RV_{Developed}$) are computed with and without reduction practices.

Drainage Area A		A Soils	B Soils	C Soils	D Soils	Total Area (acres): 0.1447
Forest/Open Space -- undisturbed, protected forest/open space or reforested land	Area (acres)	0.0000	0.0000	0.0000	0.0000	Runoff Reduction Volume (ft³): 0.0000
	CN	30	55	70	77	
Managed Turf -- disturbed, graded for yards or other turf to be mowed/managed	Area (acres)	0.0000	0.0000	0.0671	0.0000	
	CN	39	61	74	80	
Impervious Cover	Area (acres)	0.0000	0.0000	0.0776	0.0000	
	CN	98	98	98	98	
					$CN_{(D.A. A)}$	87

	1-year storm	2-year storm	10-year storm
$RV_{Developed}$ *(watershed-inch)* with no Runoff Reduction*	1.4716	1.8972	3.4168
$RV_{Developed}$ *(watershed-inch)* with Runoff Reduction*	1.4716	1.8972	3.4168
Adjusted CN*	87	87	87

*See Notes above

Drainage Area B		A Soils	B Soils	C Soils	D Soils	Total Area (acres): 0.1689
Forest/Open Space -- undisturbed, protected forest/open space or reforested land	Area (acres)	0.0000	0.0000	0.0000	0.0000	Runoff Reduction Volume (ft³): 138.1363
	CN	30	55	70	77	
Managed Turf -- disturbed, graded for yards or other turf to be mowed/managed	Area (acres)	0.0000	0.0000	0.0847	0.0000	
	CN	39	61	74	80	
Impervious Cover	Area (acres)	0.0000	0.0000	0.0842	0.0000	
	CN	98	98	98	98	
					$CN_{(D.A. B)}$	86

	1-year storm	2-year storm	10-year storm
$RV_{Developed}$ *(watershed-inch)* with no Runoff Reduction*	1.4003	1.8177	3.3180
$RV_{Developed}$ *(watershed-inch)* with Runoff Reduction*	1.1750	1.5924	3.0926
Adjusted CN*	82	83	84

*See Notes above

Drainage Area C		A Soils	B Soils	C Soils	D Soils	Total Area (acres): 0.0290
Forest/Open Space -- undisturbed, protected forest/open space or reforested land	Area (acres)	0.0000	0.0000	0.0000	0.0000	Runoff Reduction Volume (ft³): 0.0000
	CN	30	55	70	77	
Managed Turf -- disturbed, graded for yards or other turf to be mowed/managed	Area (acres)	0.0000	0.0000	0.0273	0.0000	
	CN	39	61	74	80	
Impervious Cover	Area (acres)	0.0000	0.0000	0.0017	0.0000	
	CN	98	98	98	98	
					$CN_{(D.A. C)}$	75

	1-year storm	2-year storm	10-year storm
$RV_{Developed}$ *(watershed-inch)* with no Runoff Reduction*	0.7643	1.0804	2.3202
$RV_{Developed}$ *(watershed-inch)* with Runoff Reduction*	0.7643	1.0804	2.3202
Adjusted CN*	75	75	75

*See Notes above

Site Results (Water Quality Compliance)

Area Checks	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	AREA CHECK
FOREST/OPEN SPACE (ac)	0.0000	0.0000	0.0000	0.0000	0.0000	OK.
IMPERVIOUS COVER (ac)	0.0776	0.0842	0.0017	0.0000	0.0000	OK.
IMPERVIOUS COVER TREATED (ac)	0.0000	0.0842	0.0000	0.0000	0.0000	OK.
MANAGED TURF AREA (ac)	0.0671	0.0847	0.0273	0.0000	0.0000	OK.
MANAGED TURF AREA TREATED (ac)	0.0000	0.0689	0.0000	0.0000	0.0000	OK.
AREA CHECK	OK.	OK.	OK.	OK.	OK.	

Site Treatment Volume (ft³) 706.6850

Runoff Reduction Volume and TP By Drainage Area

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	TOTAL
RUNOFF REDUCTION VOLUME ACHIEVED (ft³)	0.0000	138.1363	0.0000	0.0000	0.0000	138.1363
TP LOAD AVAILABLE FOR REMOVAL (lb/yr)	0.2018	0.2249	0.0174	0.0000	0.0000	0.4440
TP LOAD REDUCTION ACHIEVED (lb/yr)	0.0000	0.1192	0.0000	0.0000	0.0000	0.1192
TP LOAD REMAINING (lb/yr)	0.2018	0.1057	0.0174	0.0000	0.0000	0.3248
NITROGEN LOAD REDUCTION ACHIEVED (lb/yr)	0.0000	0.9923	0.0000	0.0000	0.0000	0.9923

Total Phosphorus

FINAL POST-DEVELOPMENT TP LOAD (lb/yr)	0.4440
TP LOAD REDUCTION REQUIRED (lb/yr)	0.1188
TP LOAD REDUCTION ACHIEVED (lb/yr)	0.1192
TP LOAD REMAINING (lb/yr):	0.3248
REMAINING TP LOAD REDUCTION REQUIRED (lb/yr):	0.0000 **

**No further TP load reduction required

Total Nitrogen (For Information Purposes)

POST-DEVELOPMENT LOAD (lb/yr)	3.1764
NITROGEN LOAD REDUCTION ACHIEVED (lb/yr)	0.9923
REMAINING POST-DEVELOPMENT NITROGEN LOAD (lb/yr)	2.1841

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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 Reduction Achieved	Site Latitude (Decimal Degrees)	Site Longitude (Decimal Degrees)	Anticipated Start Date
20-0227	LDA20215	0.3425	33.6	47.7	0.36	0.44	0.12	2.60	3.18	0.99	0.3425	0.0000	0.2274	0.1152	0.0000	0.1791	0.1635	578.6917	706.6850	138.1363	38.859370	-77.090030	8/1/2021

Stormwater Management Facility Information- Revised 3/19/2019

Facility Type**	Description	Location	LDA Permit #	Project SWM #	Building Permit #	Facility ID	BMP downstream of another BMP (in Series)?	Upstream (Primary) BMP	Chesapeake Bay Segment	Watershed	HUC6	Soils	Runoff Treated (in)	Volume Treated (ft³)	Treated Area (acres)	Forest Area (acres)	Turf Area (acres)	Impervious Area (acres)	RPC	Phosphorus Efficiency (%)	Nitrogen Efficiency (%)	Sediment Efficiency (%)	TP load removed (lbs)	TN load removed (lbs)
BIORETENTION #1	RAIN GARDEN	EAST FRONT YARD	LDA20215	20-0227		20-0227A	No		POTTF_VA	Arlington Branch	PL25	C/D	1.00	126.1	0.0497	0.0000	0.0171	0.0326	32008011	55.00	64.00	75.00	0.04	0.36
BIORETENTION #1	RAIN GARDEN	SOUTHEAST CORNER	LDA20215	20-0227	0	20-0227B			POTTF_VA	Arlington Branch	PL25	C/D	1.00	120.5	0.0474	0.0000	0.0162	0.0312	32008011	55.00	64.00	75.00	0.04	0.35
BIORETENTION #1	RAIN GARDEN	SOUTH FRONT YARD	LDA20215	20-0227	0	20-0227C			POTTF_VA	Arlington Branch	PL25	C/D	1.00	98.8	0.0560	0.0000	0.0356	0.0204	32008011	55.00	64.00	75.00	0.03	0.28

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SWM & BMP CHECKLIST & SWM AGREEMENT

ARLINGTON, VIRGINIA
DEPARTMENT OF ENVIRONMENTAL SERVICES

1212 SOUTH IRVING STREET

LOT 41-B AND PARCEL 10, C.B. MUNSON'S 2ND ADDITION TO ARLINGTON
GRADING PLAN
ARLINGTON COUNTY, VIRGINIA

SCALE: **NONE** | DRAWN DL | CHECKED KW
SUBMITTED DATE
REVISION FOR PERMIT: 05/21/2021
APPROVED DATE
DIRECTOR OF ENVIRONMENTAL SERVICES
SHEET: **C-0702**

File No. AN-11 Tax Map No. 73-12 Job No. 19-115 Cadd Dwg. File: Q:\sdskproj\19115\dwg\engineering\grading plan\19115C-0701.dwg Xref: Grading Plan\19115B-0001