STORMWATER MANUAL:
A GUIDE TO STORMWATER REQUIREMENTS FOR LAND DISTURBING ACTIVITIES IN ARLINGTON COUNTY

April 2023

ARLINGTON
VIRGINIA

Highlights of this version of the Stormwater Manual compared to the July 2021 version

The following text summarizes key changes to this version of the Stormwater Manual compared to the July 2021 version. This summary is provided for convenience and general reference only. Please refer to the specific sections of the Manual to design and construct your project and consult your plan reviewer if you have questions.

Section	Summary
2.2.1.1 Impervious Cover	• Clarification that existing/new vegetated surfaces over impervious subsurfaces are considered impervious land cover because they prevent natural infiltration of water into soil on the land surface
2.2.2 Water Quantity Technical Criteria	• Clarification of water quantity flow chart requirements and minimum detention requirements. • Clarification that sites with an increase in impervious area resulting in a detention requirement in the downhill drainage area (DDA) and no public storm drain connection in the DDA must follow the 'Alternative compliance option.' Traditional detention systems and the 1% rule do not apply. • Clarification that underground detention systems cannot be used for the 'Alternative compliance option.' • Additional requirements for underground detention systems on single family residential lots. • Clarification of 100% void drywell spacing requirements. • Addition of detention storage credit for stone bedding/fill material used with 100% void drywells.

2.2.3 Water Quality Technical Criteria	• Release from detention tanks to multiple urban planter boxes in series requires pre-approval and will be considered only under extenuating circumstances.
	• Planter boxes shall not be constructed using wood materials.
	• Trees no longer allowed in urban street bioretention systems.
	• For downstream planter boxes in series, a landscape plan designed for a drier hydrologic regime shall be submitted for review.
	• Clarification that waterproofing must meet the specification of the Virginia Residential Code (208), R406.2 or most recent equivalent (except that plastic and PVC liners are not permitted). This also applies to detention tanks constructed from concrete materials.
	• Other miscellaneous clarifications to specifications, including but not limited to:
	  • No. 9: Bioretention
	  ○ Clarifications to use of geotextile/liner
	  ○ Update to Microbioretention underdrain specifications
	  ○ Urban planter box:
	  ▪ Maximum height from the top of mulch elevation to the top of the planter box wall shall not exceed 15 inches
	  ▪ Minimum of 9-inch stone jacket for 4 inch underdrain

Section	Summary
	▪ Planting plan for downstream planter box in series shall be suitable for a drier hydrologic regime and submitted for review ○ Urban street bioretention filter: ▪ No trees are permitted in these systems due to concerns about stability and longevity ▪ New inflow detail ▪ Follow Material Specifications for Bioretention basins
	• Swimming pools in the DDA that drain to the sanitary sewer system may be excluded from the impervious surface detention calculations for the DDA, depending upon the details of the sanitary connection, off-season pool runoff characteristics, and other factors to be determined during plan review. The swimming pool area still must be included in the total site impervious area calculations. • Tips and reminders for project success. • Clarifications for acceptable tank materials and construction. See Plan Template for details.
2.12 Post Construction Inspection and Maintenance Requirements	• Addition of photo documentation requirements for dry wells and manufactured facilities
3.2.2 Tree Protection Plan	• Additional drawing, specification, and documentation requirements • Addition of structural root zone impact documentation • Clarification that trees on public property shall not be removed without County Urban Forester approval per Chapter 67
3.2.3 Tree Planting/Landscape Plan	• Multiple clarifications of soil profile rebuilding (SPR) requirements
Appendix E	• Updated to link to 'Recommended Trees' webpage, which now includes tree canopy credits
Appendix F	• Updated to reference to DPR Design Standards
Appendix G	• Updates to processes for submittals on page 2 and 3 to include the use of Permit Arlington • Updates to all checklists to include the use of Permit Arlington to schedule preinstallation meetings • Removal of Tree Filter Checklist • Addition of Urban Street Bioretention checklist • Updates to Rainwater Harvesting Certification Letter

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Appendix D: Exception Request Form
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Appendix F: Tree Protection and Planting Standards (DPR Design Standards)
Appendix G: Construction Inspection Checklists and Certification Templates

Abbreviations/Definitions

Chapter 57 – Erosion and Sediment Control Ordinance
Chapter 60 – Stormwater Management Ordinance
Chapter 61- Chesapeake Bay Preservation Ordinance
CO – Certificate of Occupancy
DES – Arlington County Department of Environmental Services
Director – Director of the Department of Environmental Services or designee.
DEQ – Virginia Department of Environmental Quality
ISD – Arlington County Inspection Services Division
LDA – Land Disturbing Activities Permit
MMA – Maintenance and Monitoring Agreement
RPA – Resource Protection Area
SWMF – Stormwater Management Facility
VRRM – Virginia Runoff Reduction Method
WQIA – Water Quality Impact Assessment

1 Introduction

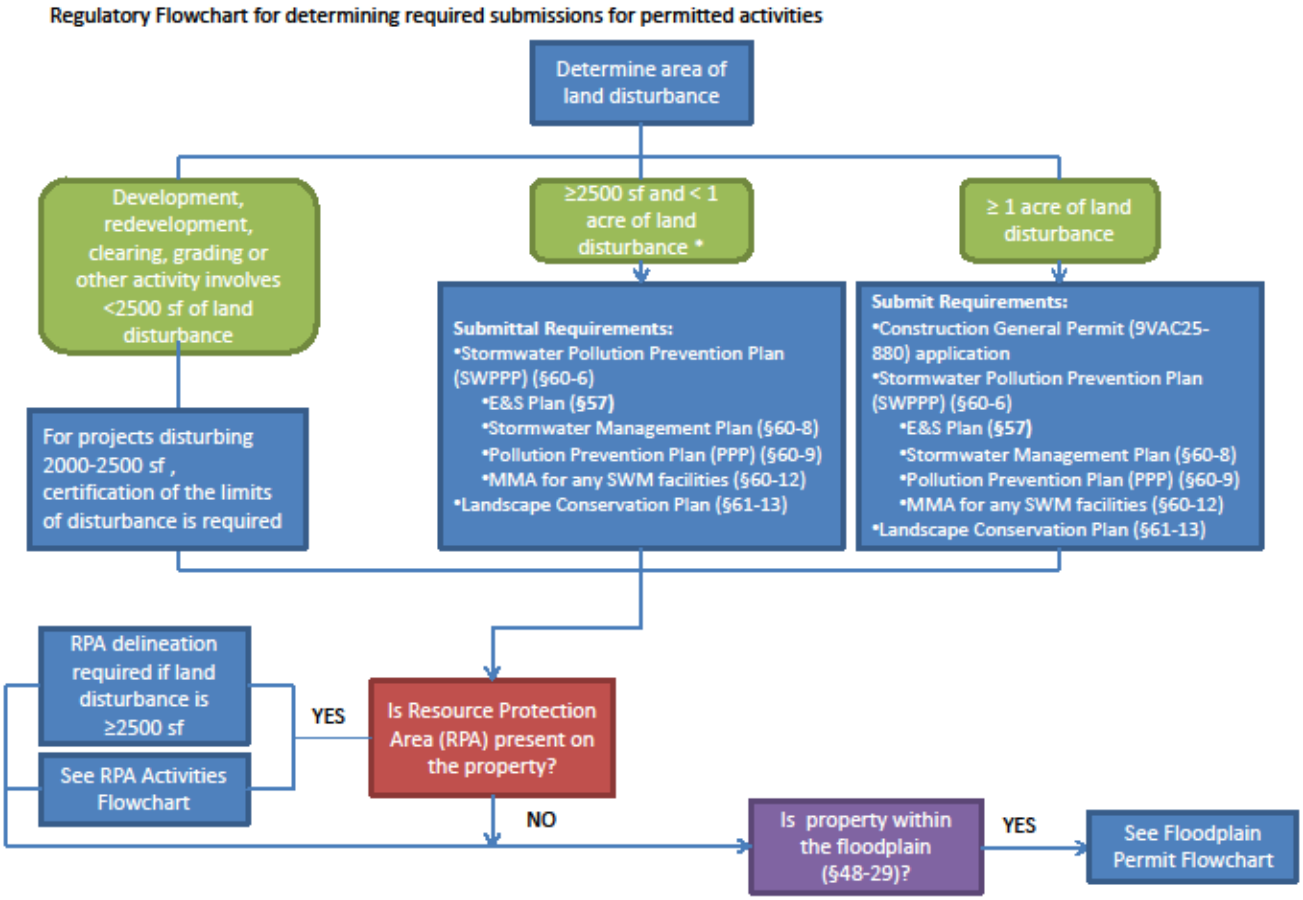
This Manual outlines the stormwater requirements for all land disturbing activities in Arlington. A Land Disturbing Activity/Stormwater (LDA) Permit is required for any land disturbing activities that disturb equal to or greater than 2,500 square feet of land, as required by the Erosion and Sediment Control Ordinance (Chapter 57), Stormwater Management Ordinance (Chapter 60), and the Virginia Erosion and Sediment Control Program. Land disturbing activities within Resource Protection Areas (RPAs) regulated under Chesapeake Bay Preservation Ordinance (Chapter 61) are also governed by this Manual.

The term 'Director' in this Manual refers to the Director of the Department of Environmental Services (DES) or designee.

The area of land disturbance includes cumulative land disturbance over two (2) years, which will be calculated for any project during this period that involves structures, paved areas, and/or retaining walls to track whether the cumulative threshold is exceeded.

Projects with land disturbance of 2500 square feet or greater are subject to the requirements of Chapter 2 and 3 of this Manual. Any land disturbance in a Resource Protection Area (RPA) is subject to the requirements of Chapter 4 of this Manual.

The following flowchart outlines the submission process for activities that will cause land disturbance.



*The Stormwater Pollution Prevention Plan (SWPPP) in §60-6 applies if the cumulative land disturbance on a site will be ≥2500 sf within two years, even if separate permits are obtained.

2 Stormwater Pollution Prevention Plan (SWPPP) Requirements

Any activity that disturbs 2500 square feet or more of land requires a Stormwater Pollution Prevention Plan per the requirements of Arlington County Code Chapter 60. This plan contains the following elements:

- Erosion and Sediment (E&S) Control Plan
- Stormwater Management Plan (SWMP)
- Pollution Prevention Plan (P2 Plan)
- Virginia Stormwater Management Program (VSMP) Requirements
- Stormwater Facility Maintenance and Monitoring Agreement (MMA)

2.1 Erosion and Sediment (E&S) Control Plan

An erosion and sediment control plan must be submitted that satisfies the requirements of Arlington County's Erosion and Sediment Control Ordinance (Chapter 57 of the County Code).

Specifically, the E&S plan must:

- Minimize the construction footprint.
- Delineate the limits of clearing and grading, including details about how these limits will be physically marked in the field.
- Delineate the RPA boundary (see Chapter 4 of this Manual), including details about how this boundary will be physically marked in the field.
- Include tree protection measures required under the approved Landscape Conservation Plan to ensure protection during clearing, grading, and all phases of construction.
- Provide for a single ingress/egress point for construction activities, unless otherwise approved by the County Manager.
- Include a general note tailored to the site conditions that includes the language “The County E&S inspector has the authority to require additional controls as needed.”

2.2 Stormwater Management Plan (SWMP)

The Stormwater Management Plan (SWMP) contains the elements in Section 2.2.1 in addition to the details of any stormwater management facility (SWMF) used to meet the requirements of Sections 2.2.2 and 2.3.3. A stormwater management facility (SWMF) is a control measure that manages stormwater runoff and changes the characteristics of that runoff including, but not limited to, the quantity and quality, the period of release or the velocity of flow and may also be called a best management practice (BMP).

2.2.1 Contents of Plan

All Stormwater Management Plans must be signed and sealed by a professional registered in the Commonwealth of Virginia and must include the following items:

- Contact information including the name, mailing address, email address, and telephone number of the owner and the RPC number and parcel number of the property or properties affected;
- A narrative that includes a description of current site conditions and final site conditions;
- A general description of the proposed stormwater management facilities and the mechanism through which the facilities will be operated and maintained after construction is complete;
- A map or maps of the site that depicts the topography of the site and includes:

    - All contributing drainage areas including pre-development and post-development areas;
    - Existing streams, ponds, culverts, ditches, wetlands, other water bodies, and floodplains;
    - Soil types, infiltration rates (using test procedures in Virginia Stormwater BMP Clearinghouse Appendix 8-A), and depth of water table at location of proposed SWMFs (if SWMF uses infiltration);
    - Forest cover, and other vegetative areas;
    - Current land use including existing structures (and downspouts), roads, and locations of known utilities and easements;
    - Sufficient information on adjoining parcels to assess the impacts of stormwater from the site on these parcels;
    - The limits of clearing and grading, and the proposed drainage patterns on the site;
    - Proposed buildings (including downspouts), roads, parking areas, utilities, and stormwater management facilities;
- Completed and executed copy of Stormwater Facility Monitoring and Maintenance Agreement (MMA);
- Hydrologic and hydraulic computations outlined in Section 2.2.2, including runoff characteristics;
- Runoff reduction computations outlined in Section 2.2.3.

2.2.1.1 Impervious cover

Chapter 60 defines impervious cover as “a surface composed of any material that significantly impedes or prevents natural infiltration of water into the soil. Depending on the design, impervious surfaces may include, but are not limited to: roofs, buildings, streets, parking areas, and any concrete, asphalt, or compacted gravel or dirt surface.”

At a minimum, the following gravel and dirt surfaces are considered impervious:

- Any gravel or dirt surface used for the parking of vehicles.
- Any dirt surface under a deck.

The following gravel surfaces are not considered impervious:

- Areas under a deck or similar structure designed for water to flow through the surface material with at least six (6) inches of gravel on the ground underneath and less than four (4) feet of clearance to prevent frequent use that causes compaction.
- Dry wells, level spreaders, and other drainage features required by the LDA permit.

Existing vegetated surfaces (pre-development) over impervious sub-surfaces (e.g., parking decks, roofs) are considered impervious land cover because they prevent natural infiltration of water into soil on the land surface.

New vegetated surfaces (post-development) over impervious sub-surfaces are also considered impervious land cover. If these surfaces meet the minimum requirements for a vegetated roof BMP, then that BMP credit is applied.

Swimming pools are also considered impervious cover under the definition in Chapter 60. There also additional specific provisions that apply to swimming pools:

- Projects that include swimming pools are not eligible for an exception. See 2.9.1.6

- Under the Alternative Compliance Option (2.9.2), swimming pools that drain to the sanitary sewer system may be excluded from the impervious surface calculations for detention requirements for the portion of the site that drains toward other properties, depending upon the details of the sanitary connection, off-season pool runoff characteristics, and other factors to be determined during plan review. The swimming pool area still must be included in the total site impervious area calculations.
- For projects that do not choose the Alternative Compliance Option, swimming pools that drain to the sanitary sewer system may be excluded from the impervious surface calculations for determining the runoff curve number (CN) for the portion of the site that drains toward other properties, depending upon the details of the sanitary connection, off-season pool runoff characteristics, and other factors to be determined during plan review.

2.2.1.2 Impervious cover removal

Impervious cover removed from a property prior to LDA permit application can be counted as part of the existing land cover conditions as follows:

1. If no LDA or other demolition permit was obtained for the removal, the impervious cover removed may be counted for up to five (5) years from the date of removal if acceptable, time-referenced documentation is provided to the Director. Examples of acceptable documentation may include but are not limited to photographs (aerial and ground-based) and contractor invoices.

   The Director will determine whether the documentation verifies the timing and amount of removal and, if so, the credit provided will be the verifiable surface area of impervious cover removed.

   After five (5) years, the credit provided will be 50 percent of the verifiable surface area removed, with no credit provided after 10 years.

2. If an LDA or other demolition permit was obtained for the removal of the impervious cover, the surface area of impervious cover removal documented with the permit information may be counted as follows:

All projects except County projects

Time from date of removal permit issuance to date of LDA permit application	Pro-rated impervious cover removal credit
0 – 5 years	100% credit
>5 – 10 years	75% credit
>10 – 15 years	50% credit
>15 – 20 years	25% credit
>20 years	0% credit

County projects
Because of the long planning, civic engagement, and funding timelines associated with County projects, including the 10-year planning horizon for the Capital Improvement Plan, full (100%) credit for impervious cover removal will be provided for 10 years from the date that permit(s) were issued for the impervious cover removal.

Following the end of the 10-year full credit period, the pro-rated crediting is the same as for other projects:

Time from date of removal permit issuance to date of LDA permit application	Pro-rated impervious cover removal credit
0 – 10 years	100% credit
>10 – 15 years	50% credit
>15 – 20 years	25% credit
>20 years	0% credit

3. For impervious cover removal within Resource Protection Areas (RPAs) regulated under Chapter 61 (Chesapeake Bay Preservation Ordinance), the following policies govern:
   A. Determination of 'allowable redevelopment' under 61-7.A.2:
   Redevelopment outside of locally designated Intensely Developed Areas designated by the County shall be permitted only if there is no increase in the amount of impervious cover within the RPA and there is no further encroachment within the RPA….

   Any impervious cover removed from a site within the preceding (2) years may be counted as impervious cover for the pre-development condition, if a valid demolition permit was obtained for the project or other time-referenced documentation, as set forth in 1. Above, is provided that is acceptable to the Director.

   B. Determination of existing impervious cover for calculating compliance with the stormwater management requirements of Chapter 60: The policies outlined under 1. And 2. Above govern, as applicable.

2.2.2 Water Quantity Technical Criteria

All land disturbing activities greater than or equal to 2500 square feet are required to follow the steps in the Compliance Flow Chart for Water Quantity and subsequent flow charts to achieve compliance, unless the Alternative Compliance Option (2.9.2) for single family homes is chosen or Streamlined Method (2.9.3) applies.

These flow charts define the flood control and channel protection criteria adopted with the Stormwater Management Ordinance (Chapter 60) in 2014.

Flood control highlights include:

- Use of energy balance detention for flood control does not require any further analysis of the system.
- Otherwise, follow the flood control flow chart. At a minimum, detention is required to maintain post-development peak flow at or less than pre-development peak flow. This is required even where the '1% rule' is applicable.
- Further, the post-development peak flow must be contained within the system down to the '1% rule' limits of analysis. If this cannot be demonstrated, energy balance detention design may be used to achieve compliance.

A Water Quantity Energy Balance Worksheet is provided on the County's webpage to assist with this analysis.

For single family homes built separately covered in Section 2.9, the following additional limitations and conditions apply:

Sites with downhill drainage area (DDA[2])

- Where there is an increase in impervious area in the DDA and there is no public storm drain connection on the site in the DDA for the detention system outfall, the 'Alternative Compliance Option' in Section 2.9.2 is required.
- Discharges of concentrated flow from a traditional detention system through other private properties is not the intent of State code and is expected to cause adverse impacts. The '1% rule' also does not apply.

Use of underground detention systems on single family home lots

- Cannot be used for 'Alternative Compliance Option.'
- Allowed only if the control structure and all storage chamber(s) can be accessed for both visual and structural inspection and maintenance.

[2] The downhill drainage area (DDA) is the portion of the site that drains to adjacent properties before runoff reaches the public right-of-way and/or storm drain system. See Section 2.9.2 .

- Cannot be located closer than 10 feet from the edge of the facility to the home foundation to ensure structural integrity, safety, and access for future maintenance and repair.
- Cannot be located closer than five (5) feet from any lot line.
- For interior lots, cannot be located in side or rear yards due to difficulty of maintenance and repair access by contractors. For corner lots can be located only in the yards facing the street, Other potential constraints, such as steep slopes, will be evaluated on a case-by-case basis.
- May carry additional maintenance burden which will be specified in the approved maintenance schedule.
- Must release by gravity flow to the public storm drain system.

Requirements for Channel Protection downstream analysis

Pipe system/channel analysis is to ensure that the 2-year 24-hour storm will not cause erosion. Criteria listed below must be provided for the pipe system analysis. Downstream analysis should be taken to the 1% rule based on drainage area or peak flow for discharge from the entire drainage area for the storm event.

For projects that discharge into a pipe system the following information must be provided on the plans:

1. A table that provides the following at every point of inflow along the conveyance:
    a. From
    b. To
    c. Drainage area (DA) in acres
    d. Runoff Coef. “C”
    e. Incremental DA
    f. Accumulated DA
    g. Time of Conc. –“I” in/hr
    h. Time of Conc. – To pipe in min.
    i. Incremental flow “Q”
    j. Accumulated flow “Q”
    k. Pipe Diameter in inches
    l. Pipe Material Type
    m. Mannings coefficent “N” for pipe
    n. Pipe slope in %
    o. Max “Q” cfs for pipe
    p. Velocity fps
    q. Time in pipe minimum
    r. Length in feet
    s. Fall in feet
    t. Invert upper
    u. Invert lower
2. Profiles of conveyance system must be provided and include the following:
    a. Structure id
    b. Pipes
    c. Structures – top elevation and inverts
    d. Existing grade
    e. Hydraulic grade line for 10-year 24-hour storm

If the downstream analysis extends beyond the pipe system, the criteria below must be used. If the pipe system discharges into a restored natural conveyance, the restored section design storm for the entire basin needs to be used to check for erosion. Note that the 1% rule for peak flow is based on the 1-year 24-hr storm, not the 2-year 24-hour storm.

1. Channel/ditch will be checked to ensure that the 2-year 24-hour storm design storm will not cause erosion.
2. Plans must include cross-sections. The cross-sections should be chosen at appropriate locations that are perpendicular to the channel. Cross-sections should be taken at a minimum at the outlet of the stormwater conveyance and breaks in channel/ditch grades. Maximum spacing between cross-sections is 100 feet.

Requirements for Flood Control downstream analysis

For projects that discharge into a channel or ditch the following must be provided on the plans:

1. Channel/ditch capacity will be checked to ensure that the 10-year 24-hour storm design storm will not overtop the banks.
2. Plans must include cross-sections. The cross-sections should be chosen at appropriate locations that are perpendicular to the channel. Cross-sections should be taken at a minimum at the outlet of the stormwater conveyance and breaks in channel/ditch grades. Maximum spacing between cross-sections is 100 feet.

Requirements for Sheet Flow

All properties must satisfy the sheet flow provisions of 9VAC25-870-66:

Increased volumes of sheet flow resulting from pervious or disconnected impervious areas, or from physical spreading of concentrated flow through level spreaders, must be identified and evaluated for potential impacts on down-gradient properties or resources. Increased volumes of sheet flow that will cause or contribute to erosion, sedimentation, or flooding of down gradient properties or resources shall be diverted to a stormwater management facility or a stormwater conveyance system that conveys the runoff without causing down gradient erosion, sedimentation, or flooding.

Dry wells are required for every point of discharge and shall not release stormwater closer than 10 feet to the downhill property line or 5 feet from the uphill property line. Dry wells shall also not be sited closer than 10 feet to any structure.

Concentration of runoff from multiple downspouts to a single release location shall be minimized. The overall excavation footprint allowed for dry wells in any single location is limited to minimize the potential for soil compaction as well as overwhelming the infiltration capacity of the soil, as follows:

Type	Limit
100% void	No more than four 50 gallon dry wells, spaced at 6” between each dry well and 1’ between the dry well and the edge of the excavation
Stone	No more than 20 square feet for each dry well, 3’ deep

In addition, each dry well installation shall not be located any closer than five (5) feet from any other installation. Release on slopes that exceed 10% will require energy dissipation practices determined during plan review.

The 100 percent void style dry well style will also be required when used as a stand-alone detention practice (not downstream from a stormwater planter or tank).

Stand-alone dry wells must be sized for a minimum of 0.5 inches from the contributing rooftop area.

100 percent void style dry wells will receive additional storage credit for stone bedding/fill material (automatically calculated in spreadsheet).

Please refer to the dry well details in the Plan template for all details and specifications that apply to these facilities.

If drainage is piped directly into the well, the downspout directed towards the dry well should have a leaf guard, the inflow pipe shall be set at a minimum 0.5% slope, and the upstream invert elevation shall be higher than the ground elevation above the well. The dry well can be designed with a pop-up emitter as the emergency overflow and the observation well. If designed with turf coverage, the topsoil and turf layer shall provide 6-8" coverage on top of the well and be separated from the stone reservoir by geotextile.

An executed Stormwater Facility Monitoring and Maintenance Agreement (MMA) is required for projects with dry wells only.

LDA projects that do not follow the Alternative Compliance Option under Section 2.9.2 may require additional storage with the use of rain gardens, dry wells, etc. in order to meet the Sheet flow requirements of Chapter 60.

Material Specifications for Dry Wells. Below is the table of material specifications for dry wells.

Material Specifications for Dry Wells

Material	Specification
Stone	VDOT No. 57
Observation Well/ Overflow	Install a vertical 4 or 6-inch Schedule 40 PVC perforated pipe, with a pop-up emitter and anchor plate. Pipe perforations are 3/8 inches at 6 inches on center.
Anchor Plate	Install a 6" square metal plate for installations with 4" PVC pipe. Install an 8" square plate for installations with 6" PVC pipe.
Surface Cover	Install a 3-inch layer of river stone or pea gravel. Turf is acceptable when there is subsurface inflow (e.g., a roof leader).
Filter Fabric	Must be installed on the dry well sides. When turf is used as a surface cover, fabric shall be installed along the top between the stone layer and the surface cover. Use non-woven polypropylene geotextile with a flow rate of > 110 gallons/min./sq. ft. (e.g., Geotex 351 or equivalent).
Cleanout	Threaded metal rod with plate at the end installed in the observation well to facilitate cleanout.

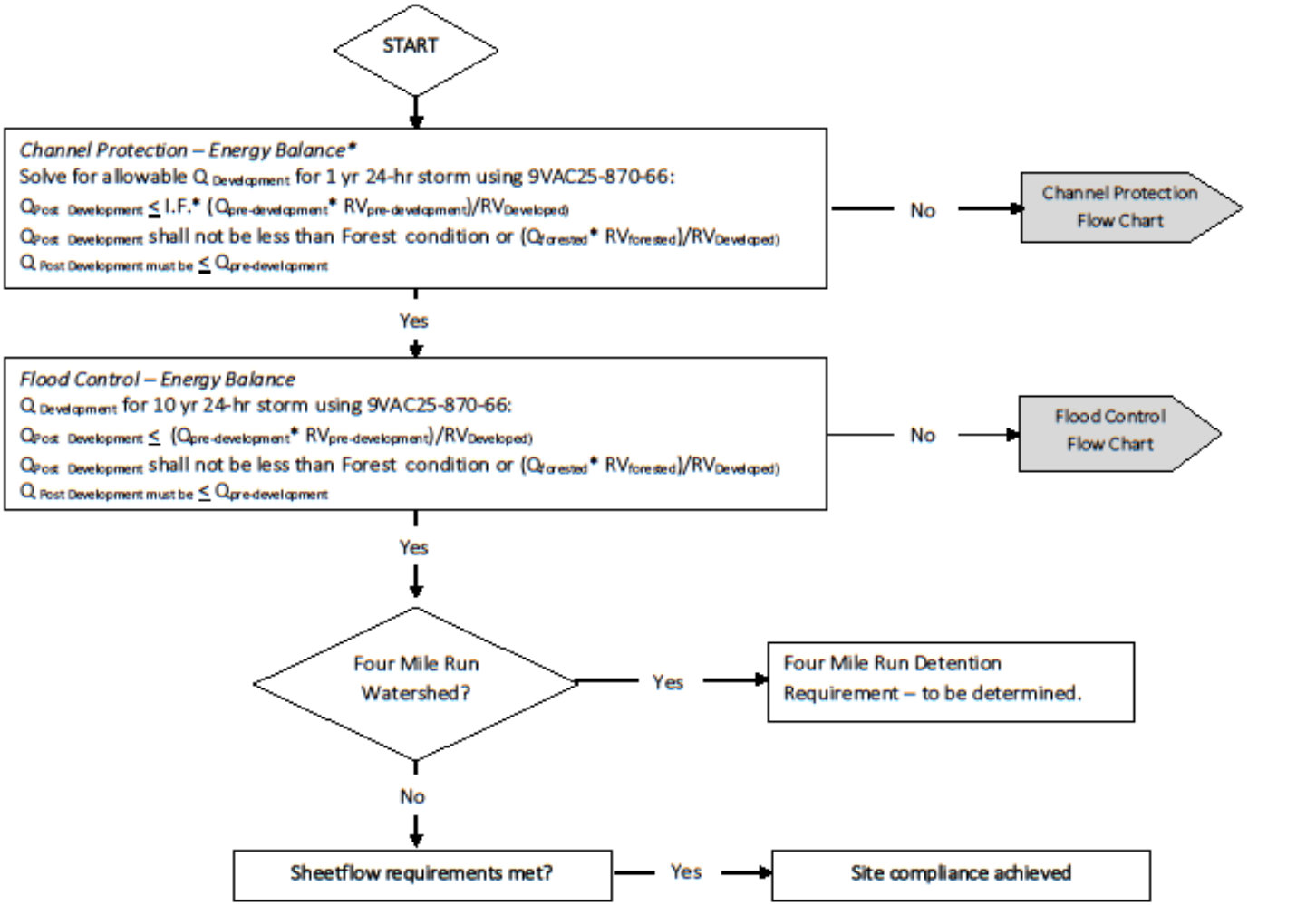
Below is the standard maintenance schedule for dry wells to be included on plans. If a manufactured device is proposed the manufacturer's guidance can be used instead.

Maintenance Schedule for Dry Wells:

Maintenance Activity	Schedule
• Remove leaves and debris in gutter at leaf guard. • Remove leaves and debris from observation well/overflow. • Inspect the condition of the overflow or pop-up emitter and make sure it is still capped and functioning.	Annually
• Inspected and certified by a professional licensed in the State of Virginia	Once every 5 years

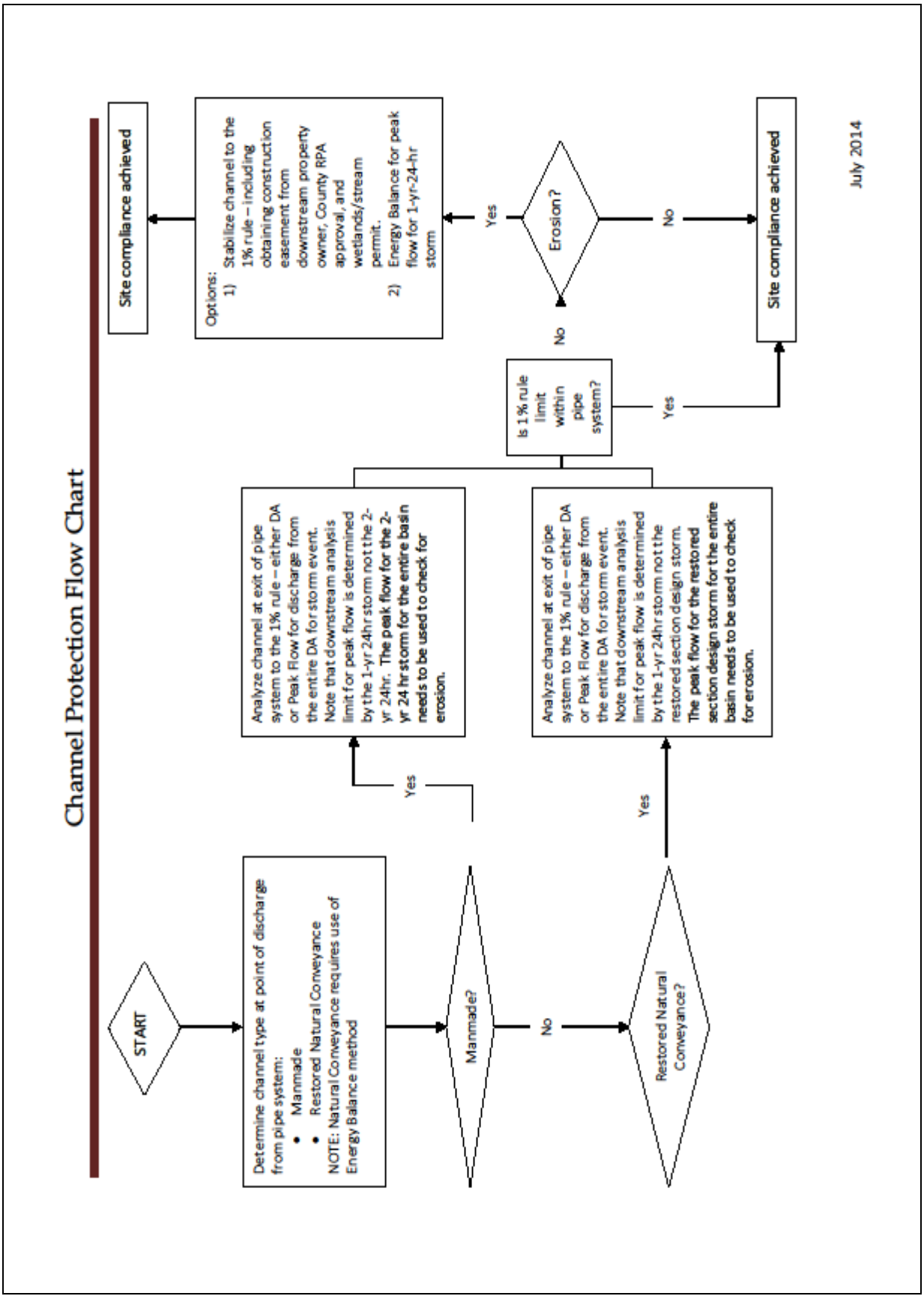
Construction Installation. Projects with only dry wells to meet the sheet flow requirement (no other SWMFs are needed) need to submit a completed dry well construction inspection checklist, photos and materials tickets (Appendix G). The completed checklist does not need to be signed by a professional.

Compliance Flow Chart for Water Quantity

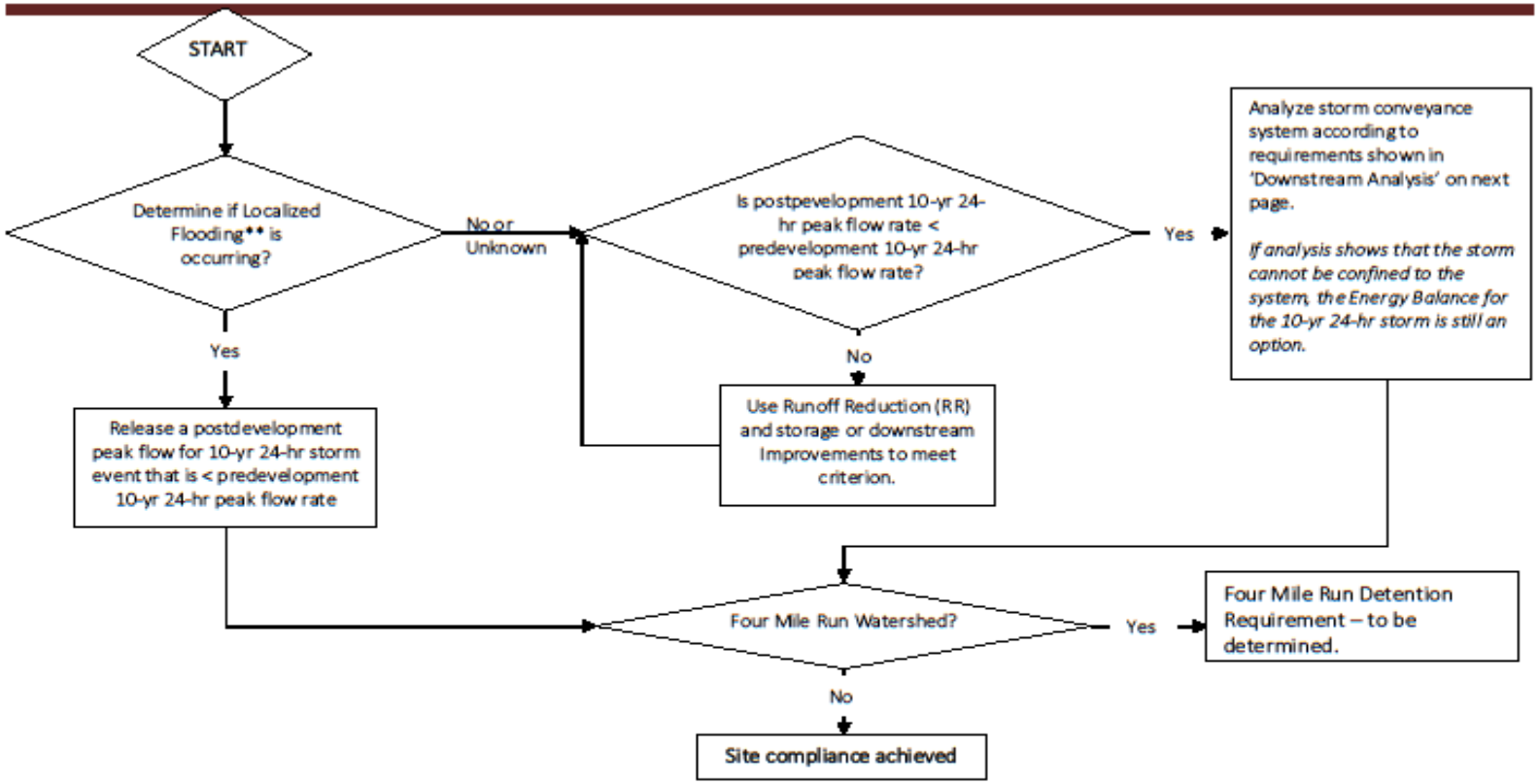


*This approach is the only approach allowed for discharges to natural channels. It can also be used for manmade and restored channels. If the applicant chooses not to use this approach for manmade and restored channels, proceed to 'Channel Protection Flow Chart.'

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Channel Protection Flow Chart
START
Determine channel type at point of discharge from pipe system:
• Manmade
• Restored Natural Conveyance
NOTE: Natural Conveyance requires use of Energy Balance method
Manmade?
Yes
No
Restored Natural Conveyance?
Yes
Analyze channel at exit of pipe system to the 1% rule – either DA or Peak Flow for discharge from the entire DA for storm event. Note that downstream analysis limit for peak flow is determined by the 1-yr 24hr storm not the 2-yr 24hr. The peak flow for the 2-yr 24 hr storm for the entire basin needs to be used to check for erosion.
Analyze channel at exit of pipe system to the 1% rule – either DA or Peak Flow for discharge from the entire DA for storm event. Note that downstream analysis limit for peak flow is determined by the 1-yr 24hr storm not the restored section design storm. The peak flow for the restored section design storm for the entire basin needs to be used to check for erosion.
Is 1% rule limit within pipe system?
Yes
No
Erosion?
Yes
No
Options:
1) Stabilize channel to the 1% rule – including obtaining construction easement from downstream property owner, County RPA approval, and wetlands/stream permit.
2) Energy Balance for peak flow for 1-yr-24-hr storm
Site compliance achieved
Site compliance achieved
July 2014

Flood Control Flow Chart



** Areas of localized flooding are defined in the adopted Stormwater Master Plan. If the site discharges directly to the stormwater main identified, or via catch basins or similar structures directly connected to the stormwater main, then the area is considered as having localized flooding. If not the site would fall into the unknown category and downstream analysis is required.

If localized surface flooding is claimed to occur on the site itself or in a proposed receiving stormwater main not identified in the Stormwater Master Plan, the applicant must provide photographic documentation, including date(s) along with signed and notarized statements of witnesses of the flooding. If this documentation supports the conclusion that localized flooding occurs, the site will be required to follow the requirements above.

July 2014

Flood Control Flow Chart

Downstream Analysis

If the peak flow from the post-development 10-year 24-hour storm is proposed to be contained within the stormwater conveyance system, then an analysis of the system to ensure the discharge stays within the system must be conducted to a point where:

- The site's contributing drainage area is less than or equal to 1.0% of the total watershed area draining to a point of analysis in the downstream stormwater conveyance system;
- Based on peak flow rate, the site's peak flow rate from the 10-year 24-hour storm event is less than or equal to 1.0% of the existing peak flow rate from the 10-year 24-hour storm event prior to the implementation of any stormwater quantity control measures; or
- The stormwater conveyance system enters a mapped floodplain or other flood prone area, adopted by ordinance, of any VSMP Authority.
- Arlington County Flood Control downstream analysis documentation and computational criteria must be met.

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2.2.3 Water Quality Technical Criteria

All Stormwater Management Plans should be prepared in conjunction with the Virginia Stormwater Management Handbook and this Stormwater Manual. Refer to Chapter 8 Design Checklists using the approved Best Management Practices (BMPs) from the Virginia Stormwater BMP Clearinghouse (with the modifications noted in "Stormwater Management Facility Design Considerations"), in addition to the following:

- A copy of the most recent Runoff Reduction spreadsheet (downloaded from Arlington County's website) including a completed 'SWMF' tab in the spreadsheet for the proposed SWMFs. Projects that choose the Alternative Compliance Option under 2.9.2 will use the Alternative Compliance Option spreadsheet and must also complete the 'SWMF' tab.
- Description of maintenance responsibilities. If a shared SWMF or SWMFs are used to meet code requirements, then a Homeowners Association shall be developed that outlines how each lot will contribute to the inspection and maintenance needs for the facility or facilities. The facility or facilities will be located within a private easement to the Homeowners Association, or each lot will have their own stormwater management facility or facilities and a maintenance agreement will be recorded for each individual lot.
- Material specifications, construction inspection checklist and maintenance schedule for each SWMF.

The Director of DES may preclude the use of any SWMF otherwise allowed, or require more stringent conditions upon its use, for a specific land-disturbing project based on a review of the stormwater management plan and project site conditions. Such limitations shall be based on site-specific concerns.

Stormwater Management Facility Design Considerations

The specifications below are clarifications or adjustments to the Virginia Stormwater BMP Clearinghouse Design Specifications that are specific to their use in Arlington.

Underdrains shall not concentrate flow. The use of pop-up emitters (and other techniques used to dissipate flow) are accepted, provided their use is appropriate as determined by a professional licensed in the State of Virginia or a County field inspector. Underdrains that discharge on slopes steeper than 10 percent shall have downstream protection. Underdrains should have the appropriate cover and discharge 10 feet from property boundaries or easements for public street purposes.

Condensate from cooling devices and sump pump discharges shall not discharge into stormwater management facilities unless the facility is specifically designed to handle that water.

Setbacks. Stormwater management facilities must comply with the minimum setback requirements established by the Virginia Stormwater BMP Clearinghouse. This also includes the setbacks from neighboring structures.

Facilities must be on the parcel for by-right projects, unless an outlot is created or other solution acceptable to the Director.

Waterproofing. If the proposed SWMF does not meet the minimum setback requirements (established by the Virginia Stormwater BMP Clearinghouse), the design must include waterproofing features specified and sealed by the engineer. The following note must be added to the plans:

Arlington County DES does not review the waterproofing design and the owner/developer agrees to hold Arlington County harmless in the event of failure.

At a minimum, waterproofing must meet the specification of the Virginia Residential Code (208), R406.2 or most recent equivalent, except that plastic and PVC liners are not permitted to be used.

These requirements also apply to detention tanks built from concrete materials.

Soil testing. Testing for infiltration rate and depth of seasonal high water table is required according to testing procedure outlined in the Clearinghouse Design Specification No. 8, Appendix 8-A (Version 2.0, 2013). All soil evaluations, including test profile pits, soil borings, and permeability tests shall be conducted under the supervision of a licensed Soil Scientist. Per the testing procedure, the seasonally high-water table (SHWT) may be determined using soil morphology throughout the year by a certified professional with training and experience in soil morphology. SHWT determination by direct observation of the groundwater level should be performed during the months of November through May. Professional engineers registered in Virginia with experience in the field of geotechnical engineering with certified training in soil morphology may also be certified to determine the SHWT.

Design Specification No. 1: Rooftop (and Impervious Area) Disconnection.

All of the design specifications are taken from the Clearinghouse Design Specification No. 1.

Design Specification No. 2: Sheetflow to Vegetated Filter Strip or Conserved Open Space.

All of the design specifications are taken from the Clearinghouse Design Specification No. 2 with the following clarifications:

Location. Proposed conserved open space area should be adjacent to a protected natural area such as publicly owned parks and resource management areas and privately-owned areas under perpetual conservation or other third party easement. It must be situated as to not result in negative impacts to existing natural resources such as wetlands.

The end of the proposed vegetated filter strips must flow into a protected natural area.

Size. The resulting conserved open space must create a contiguous natural area of a minimum of 2 acres, at least 0.25 acres or greater must be converted to conserved open space at a time.

Design. The length of the vegetated filter strips should be designed using the minimum length required for the steepest slope on any one part of the strip.

Construction. The gravel diaphragm or engineered level spreader should be installed first and then the compost amendments incorporated into the vegetated filter strip. Vegetation needs to achieve 90% coverage before flow can be diverted to the diaphragm or engineered level spreader regardless of existing vegetation or seeding of amended soils is used to achieve dense cover.

Maintenance. On private property, a third party conservation easement must be obtained or exist for the area. For existing natural areas, a long-term vegetation management plan including an invasive management plan (IMP) is required. For existing areas of turf or invasive plants, a restoration plan including a landscape plan to provide 90% cover with native plants and invasive management plan is required. Managed meadow is an acceptable interim condition, but the ultimate goal is reforestation. Soils are to remain undisturbed. On public property, educational signage, funding must be identified for at least five years of maintenance, and a Memorandum of Understanding (MOU) for long-term maintenance are required.

Design Specification No. 3: Grass Channels.

All of the design specifications are taken from the Clearinghouse Design Specification No. 3.

Design Specification No. 4: Soil Compost Amendment.

The following table clarifies the specifications for Soil Compost Amendment in the Clearinghouse Design Specification No. 4. This SWMF can only be used in series with another SWMF.

Short-Cut Method to Determine Compost and Incorporation Depths for Soils

	Contributing Impervious Cover to Soil Amendment Area Ratio [1]							
	IC/SA = 0[2]		IC/SA = 0.5		IC/SA = 0.75		IC/SA = 1.0[3]	
Soil Type	B	C/D	B	C/D	B	C/D	B	C/D
Compost (in) [4]	2-3	3-4	3 – 4.5	4.5-6	4- 6	6-8	6-8	8-10
Incorporation Depth (in)	6 - 8	8-10.5	8-10	10-12	15-16.5	16.5-18	18-21	21-24
Incorporation Method	Rototiller		Rototiller		Subsoiler		Subsoiler	

Notes:
[1] IC = contrib. impervious cover (sq. ft.) and SA = surface area of compost amendment (sq. ft.)
[2] For amendment of compacted lawns that do not receive off-site runoff
[3] In general, IC/SA ratios greater than 1 should be avoided
[4] Depth of compost added

Design Specification No. 5: Vegetated Roof.

All of the design specifications are taken from the Clearinghouse Design Specification No. 5 with the following clarification:

Maintenance Activities for Vegetated Roofs. The following is the list of maintenance activities for vegetated roofs. The table is to be included on plans proposing vegetated roofs.

Vegetated Roof Maintenance Schedule

Maintenance Activity	**Schedule**
• Water to promote plant growth and survival. • Inspect the vegetated roof and replace any dead or dying vegetation.	As Needed (Following Construction)
• Inspect the waterproof membrane for leaking or cracks. • Annual fertilization (first five years). • Weeding to remove invasive plants. • Inspect roof drains, scuppers and gutters to ensure they are not overgrown or have organic matter deposits. Remove any accumulated organic matter or debris. • Inspect the green roof for dead, dying, or invasive vegetation. Plant replacement vegetation as needed to maintain 80% plant coverage.	Semi-Annually
• Inspected and certified by a professional licensed in the State of Virginia	Once every 5 years

Design Specification No. 6: Rainwater Harvesting.

All of the design specifications are taken from the Clearinghouse Design Specification No. 6.

Design Specification No. 7: Permeable Pavement.

The design specifications are taken from the Clearinghouse Design Specification No. 7 with the following changes:

Slope. Permeable pavement systems may not be constructed in areas where the adjacent slopes are steeper than 20 percent. The slope of the surface of the permeable pavement systems shall be from 1 to 10 percent. The bottom slope of a permeable pavement installation should be as flat as possible (i.e., 0 percent longitudinal and lateral slopes) to enable even distribution and infiltration of stormwater. On sloped sites (greater than 5%), internal flow barriers (i.e. check dams) can be used to achieve the 0% slope on the bottom. If an underdrain will be used in conjunction with the flow barriers, it can be installed over the top of the barriers, or parallel to the barriers with an underdrain in each cell.

Standard details for both concrete and gravel flow barriers are provided on the Stormwater Management Ordinance webpage (details SWM#3 & 4).

Testing. The full permeability of the pavement surface shall be tested by application of clean water at a rate of at least 5 gpm over the entire surface. All water must infiltrate directly without puddle formation or surface runoff.

Driveway aisles constructed of permeable pavement are not allowed because of the difficulty in construction and maintenance of the center strip.

Porous Asphalt is not an accepted type of permeable pavement due to the difficulty of proper installation, lack of an industry certification program, burdensome maintenance record, and short lifespan.

Concrete Grid Pavers are not an approved for use as permeable pavement unless the design professional demonstrates to the satisfaction of the Director that the design provides equal or better performance than permeable interlocking concrete pavers and pervious concrete both for long term permeability and structural integrity.

Plastic Reinforced Grid Paving Systems are not approved as permeable paving systems unless the design professional demonstrates to the satisfaction of the Director that the design provides equal or better performance than permeable interlocking concrete pavers and pervious concrete both for long term permeability and structural integrity.

Other pavement surfaces. Besides permeable interlocking pavers and porous concrete, other types of permeable pavement surfaces are permitted upon the discretion of the DES Director. The other permeable surfaces must meet the subsurface layer requirements for storage, the surface layer must accept water at a rate 5 gal/min/ft2, and the surface must be maintainable.

Artificial Turf Fields may be treated as a permeable pavement provided the subsurface layer requirements for storage and the surface layer accepts water at a rate 5 gal/min/ft2.

Permeable Interlocking Paver:
Permeable interlocking pavers shall conform to all requirements of Interlocking Concrete Paver Institute (ICPI) Technical Specification Number 18 (or equivalent). All installations shall be performed by qualified personnel.
Installations of permeable interlocking concrete pavers shall be overseen by an ICPI certified installer. The installer shall be on site, overseeing each installation, during all stone reservoir/base and paver installation.

Pervious Concrete:

Pervious Concrete work shall conform to all requirements of ACI 522.1, “Specification for Pervious Concrete Pavement” published by the American Concrete Institute.

Installation of pervious concrete shall only be performed by qualified personnel. A National Ready Mixed Concrete Association (NRMCA) Certified Pervious Concrete Craftsman or Installer should be on site, overseeing each placement crew, during all concrete placement and finishing operations. Each placement crew should have at least two NRMCA certified Pervious Concrete Technicians (per ACI 522.1-13).

Material Specifications for Permeable Pavements. Below is the table of material specifications for permeable pavements.

Material Specifications for Underneath the Permeable Pavements

Material	Specification	Notes
Bedding Layer	PC: None PICP: 2 in. depth of No. 8 stone above 4 inches of No. 57	ASTM D448 size No. 8 stone (e.g. 3/8 to 3/16 inch in size). ASTM D448 size No. 57 stone (e.g. 1 1/2 to 1/2 inch in size) should be washed, clean and free of all fines.
Reservoir Layer	PC: No. 57 stone PICP: No. 2 or 3 stone	PC: ASTM D448 size No. 57 stone (e.g. 1 1/2 to 1/2 inch in size) PICP: No. 2 Stone (e.g. 3 inch to 3/4 inch in size) or No. 3 Stone. Depth is based on the pavement structural and hydraulic requirements. Should be washed, clean and free of all fines.
Underdrain	Use 4 to 6 inch diameter perforated schedule 40 PVC pipe, with 3/8-inch perforations at 6 inches on center; each underdrain installed at a minimum 0.5% slope located 20 feet or less from the next pipe (or equivalent corrugated HDPE may be used for non-vehicular applications). Perforated pipe installed for the full length of the permeable pavement cell, and non-perforated pipe, as needed, is used to connect with the storm drain system. T’s and Y’s installed as needed, depending on the underdrain configuration. Extend cleanout pipes to the surface with caps.	
Filter Layer	The underlying native soils should be separated from the stone reservoir by a 6 to 8 inch layer of coarse sand (e.g. ASTM C 33, gradation) or use an appropriate filter fabric for the particular application based on AASHTO M288-06. At a minimum the fabric shall have a Flow Rate greater than 125 gpm/sq. ft. (ASTM D4491), and an Apparent Opening Size (AOS) equivalent to a US # 70 or # 80 sieve (ASTM D4751). The geotextile AOS selection is based on the percent passing the No. 200 sieve in “A” Soil subgrade, using FHWA or AASHTO selection criteria.	
Observation Well	Use a perforated 4 to 6 inch vertical schedule 40 PVC pipe (AASHTO M 252) with a cap, installed flush with the surface. Applications in vehicular areas shall have a metal cap. All applications shall have an observation well installed.	

*PC: Permeable Concrete, PICP: Permeable Interlocking Concrete Pavers with an open surface of 5-15%.

Construction Installation. The installation and inspection of the construction of permeable pavement is to follow the Construction Inspection Checklist. The checklist is to be included on the plan (Appendix G).

Maintenance Activities for Permeable Pavement. The following is the list of maintenance activities for permeable pavement. The table is to be included on plans proposing permeable pavement.

Permeable Pavement Maintenance Schedule

Maintenance	Schedule
• Check observation wells 3 days after a storm event in excess of 1/2 inch in depth. Standing water observed in the well after three days is a clear indication of clogging. • Inspect the surface of the permeable pavement for evidence of sediment deposition, organic debris, staining or ponding that may indicate surface clogging. If any signs of clogging are noted, schedule a vacuum sweeper (no brooms or water spray) to remove deposited material. • Inspect the structural integrity of the pavement surface, looking for signs of surface deterioration, such as slumping, cracking, spalling or broken pavers. Replace or repair affected areas, as necessary. • Check inlets, pretreatment cells and any flow diversion structures for sediment buildup and structural damage. Note if any sediment needs to be removed. • Inspect the condition of the observation well and make sure it is still capped. • Generally, inspect any contributing drainage area for any controllable sources of sediment or erosion.	Annually
• Inspected and certified by a professional licensed in the State of Virginia	Once every 5 years

Design Specification No. 8: Infiltration Practices

Designs that rely substantially on infiltration (using infiltration trenches or bioretention that relies solely on infiltration) on marginal soils require the submission of an alternate design that does not rely on infiltration should the facility fail during construction.

The design specifications are taken from the Clearinghouse Design Specification No. 8 with the following changes:

Siting. Infiltration facilities may not be constructed on slopes steeper than 15 percent. In addition, facilities shall be set back a minimum of 10 feet from the property line from the down gradient property, facilities shall be set back a minimum of 5 feet from the property line from the up-gradient property. Infiltration facilities shall be located so that percolation infiltration does not saturate soil within 4 feet of public roadway subgrades.

DEQ Design Specification No. 8 states: Sites that have been previously graded or disturbed do not retain their original soil permeability due to compaction. Therefore, such sites are not good candidates for infiltration practices.

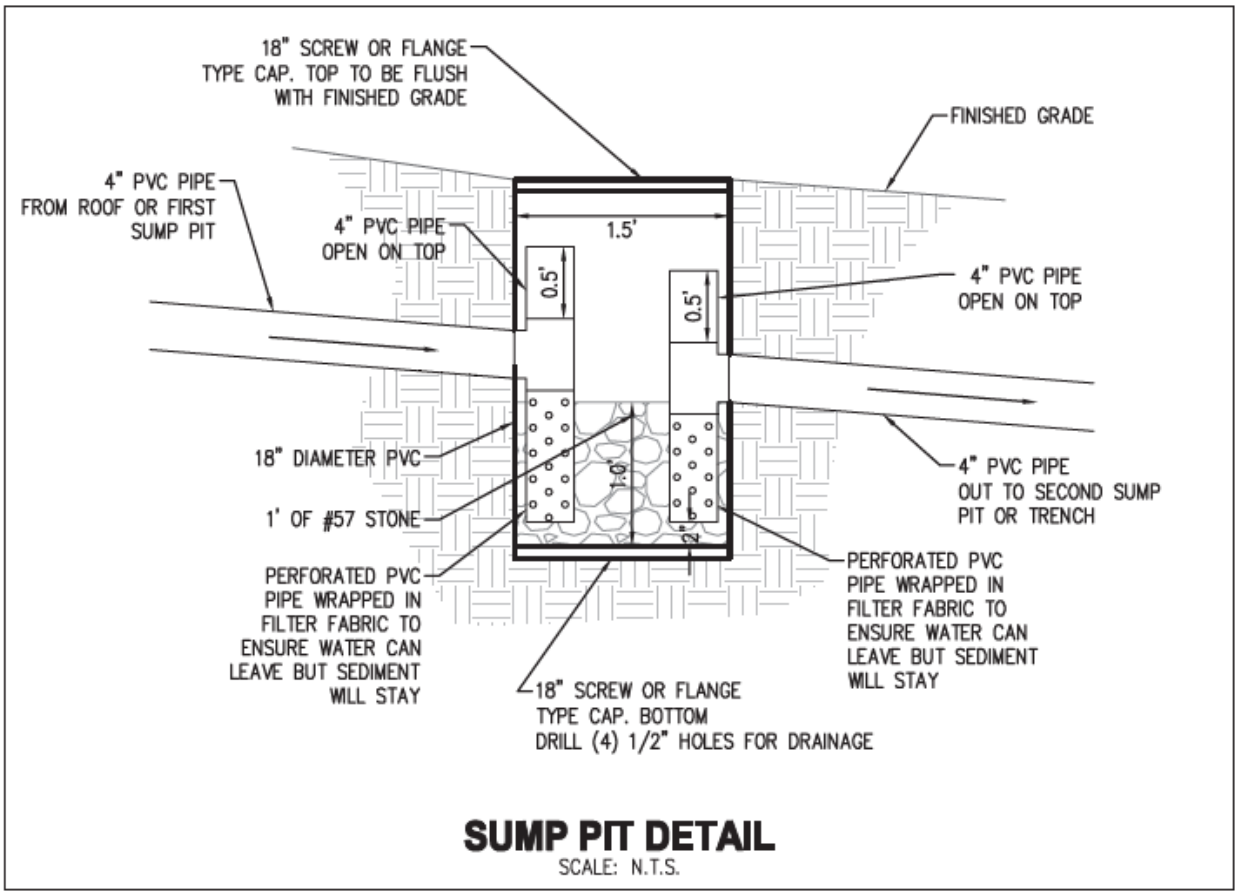
Contributing Drainage Area. The maximum ratio of contributing impervious surface to the surface area of infiltration will be 3:1 regardless of the rate of infiltration of the underlying soils

because of the risk of failure of the underlying soils over time. The maximum ratio of total contributing area to the surface area of the infiltration will be 5:1.

Sizing. The maximum length or width of an infiltration trench is 16 feet or less for SFD infill project (Smaller excavators have an 8-foot reach.) If a dimension greater than 16 feet is required, the plan must specify the type of equipment to be used to construct the trench in order to excavate the trench from the side. Equipment should be kept off the floor area of the trench to prevent soil compaction.

Micro-Infiltration design (treating 250-2500 sq ft) requires an observation well and 2 pretreatment techniques for Level I designs. Pretreatment techniques include leaf gutter screens, grass filter strips, and sump pit. Level 2 designs require 3 pretreatment techniques.

Pretreatment Sump pit pretreatment design shall include pits with lids that are 18" in diameter as shown in the design below. Double sump pits must be separate.



SUMP PIT DETAIL
SCALE: N.T.S.

Material Specifications for Infiltration Trench. Below is the table of material specifications for infiltration trenches.

Material Specifications for Infiltration Trenches

Material	Specification	Notes
Stone	Clean, aggregate with a maximum diameter of 3.5 inches and a minimum diameter of 1.5 inches (VDOT No. 1 Open-Graded Coarse Aggregate) or the equivalent.	
Observation Well	Install a vertical 6-inch Schedule 40 PVC perforated pipe, with a cap and anchor plate.	Install one per 50 feet of length of infiltration the practice.
Trench Bottom	Install a 6 to 8 inch sand layer (VDOT Fine Aggregate, Grade A or B)	
Trench Surface Cover	Install a 3-inch layer of river stone or pea gravel. Turf is acceptable when there is subsurface inflow (e.g., a roof leader).	
Filter Fabric	Filter fabric must be installed on the trench sides. When turf is used as a surface cover, fabric shall be installed along the top between the stone layer and the surface cover. Use non-woven polypropylene geotextile with a flow rate of > 110 gallons/min./sq. ft. (e.g., Geotex 351 or equivalent).	
Overflow Collection Pipe (where needed)	Use 6-inch rigid schedule 40 PVC pipe, with 3/8" perforations at 6 inches on center, installed at a slope of 1% for the length of the infiltration practice.	Install non-perforated pipe with one or more caps, as needed.

Construction Installation. The installation and inspection of the construction of an infiltration trench is to follow the Construction Inspection Checklist (See Appendix G). The checklist is to be included on the plan.

Maintenance Activities for Infiltration Trenches. The following is the list of maintenance activities for infiltration trenches. The table is to be included on plans proposing infiltration trenches.

Infiltration Trench Maintenance Schedule

Maintenance	Schedule
• Replace pea gravel/topsoil and top surface filter fabric (when clogged). • Mow vegetated filter strips as necessary and remove the clippings.	As needed
• Ensure that the contributing drainage area, inlets, and facility surface are clear of debris. • Ensure that the contributing drainage area is stabilized. • Remove sediment and oil/grease from pre-treatment devices, as well as from overflow structures. • Repair undercut and eroded areas at inflow and outflow structures.	Quarterly
• Check observation wells 3 days after a storm event in excess of 1/2 inch in depth. Standing water observed in the well after three days is a clear indication of clogging. • Inspect pre-treatment devices and diversion structures for sediment build-up and structural damage. • Remove trees that start to grow in the vicinity of the infiltration facility.	Semi-annual inspection

• Clean out accumulated sediments from the pre-treatment cell.	Annually
• Inspected and certified by a professional licensed in the State of Virginia	Once every 5 years

Design Specification No. 9: Bioretention (including Urban Bioretention)

The design specifications are taken from the Clearinghouse Design Specification No. 9 with the following changes:

Siting. Bioretention facilities may not be constructed on slopes steeper than 15 percent. Facilities shall be set back a minimum of 10 feet from the property line from the down gradient property, facilities shall be set back a minimum of 5 feet from the property line from the up gradient property. The underdrain outlet shall be a minimum of 10 feet from property lines. An underdrain should be installed, connected and capped on sites where feasible.

Side slopes should be 3:1 for bioretention (excluding Urban Bioretention).

Berm. Fill for the berm and overflow weir of a bioretention basin or filter, shall consist of clean material free of organic matter, rubbish, frozen soil, snow, ice, particles with sizes larger than 3 inches, or other deleterious material. Fill shall be placed in 8- to12-inch lifts and compacted to at least 95 percent of Standard Proctor Maximum Density in accordance with ASTM D-698, AASHTO T-99, or VDOT specifications. Compaction equipment shall not be allowed within the facility on the soil bed. The top of the berm and the invert of the overflow weir shall be constructed level at the design elevation.

Landscape Plan. Bioretention basin landscape plans and plant specifications shall be prepared by a certified landscape architect, horticulturist, or other qualified individual who has knowledge of the environmental tolerance, ecological functions, and ecological impacts of plant species. A minimum of 75% of the plants shall be locally native, and the remaining shall be not aggressive or invasive. In lieu of submitting a professionally prepared landscape plan, microbioretentions and urban bioretentions can use the species listed in DEQ Specification 9, Bioretention: Table 9.5.

Sizing. The sizing of bioretention facilities should follow the Clearinghouse Design Specification No. 9 (Version 2.0, 2013).

Material Specifications for Bioretention. The following is the table of material specifications for bioretention basins.

Bioretention Basin Material Specifications

Material	Specification	Notes
Filter Media Composition	Filter Media to contain: • 80%-90% sand with >75% being coarse to very coarse • 10%-20% soil fines • 3%-5% organic matter in the form of plant based compost meeting Clearinghouse Design Specification #4, Section 6.5	The volume of filter media based on 110% of the plan volume, to account for settling or compaction.
Filter Media Testing	Plant available P within Low+ (L+) to Medium (M) per DCR 2014 Nutrient Management Criteria (18-	The media can be procured from approved filter media vendors or mixed onsite with testing results

	40 mg/kg P for the Mehlich III procedure) and CEC >5	meeting standard for both texture and nutrient composition.
Mulch Layer	Use aged, shredded hardwood bark mulch	Lay a 2 to 3 inch layer on the surface of the filter bed.
Geotextile/Liner	Use a non-woven geotextile fabric with a flow rate of > 110 gal./min./sq. ft. (e.g., Geotex 351 or equivalent)	Install on vertical sides of facility. Do not install on bottom of facility or between layers. Install under and on sides of pretreatment stone.
Choking Layer	3 inch layer of pea gravel or VDOT #8 stone which is laid over the underdrain stone.	
Stone Jacket for Underdrain and/or Storage Layer	1 inch stone should be double-washed and clean and free of all fines (e.g., VDOT #57 stone).	12 inches for the underdrain; 12 to 18 inches for the stone storage layer, if needed
Underdrains, Cleanouts, and Observation Wells	Use 6 inch rigid schedule 40 PVC pipe for bioretention basins, with 3/8-inch perforations at 6 inches on center, maximum of 3 rows of perforations; position each underdrain on a 1% or 2% slope located nor more than 20 feet from the next pipe.	All bioretentions are to have an observation well, cleanout and overflow pipe. Lay the perforated pipe under the length of the bioretention cell, and install non-perforated pipe as needed to connect with the storm drain system. Install T's and Y's as needed, depending on the underdrain configuration. Extend cleanout pipes to the ponding elevation above the surface with vented caps at the Ts and Ys.
Plant Materials	Tree –minimum 1 inch caliper, 15' on-center. Shrub – minimum 30 inches high, 10' on-center. Perennials/Herbaceous - container-grown at 18-24 inches on center	A landscape plan is required such that: For Level 1 designs – there is 75% surface coverage within 2 years For Level 2 designs – there is 90% surface coverage within 2 years

Construction Installation. The installation and inspection of the construction of bioretentions are to follow the Construction Inspection Checklist for Bioretention (See Appendix G). The checklist is to be included on the plan.

Maintenance Activities for Bioretention. The following is the list of maintenance activities for bioretention. The table is to be included on plans proposing bioretention.

Bioretention Maintenance Schedule

Maintenance	Frequency
• Spot weeding, erosion repair, trash removal, and mulch raking	Twice during growing season
• Add reinforcement planting to maintain the desired vegetation density • Remove invasive plants using recommended control methods • Stabilize the contributing drainage area to prevent erosion	As needed
• Spring inspection and cleanup • Supplement mulch to maintain a 2-3 inch layer • Prune trees and shrubs	Annually

• Remove sediment in pre-treatment cells and inflow points	Once every 2 to 3 years
• Replace the mulch layer	Every 3 years
• Inspected and certified by a professional licensed in the State of Virginia	Once every 5 years

Microbioretention

A microbioretention means a bioretention that treats 2500 sf of impervious area or less and has a ponding depth of 6" or less. A rain garden is a microbioretention that does not meet all of the specifications in this section, such as the underdrain, depth of soil media or infiltration rates of underlying soils and is used for meeting sheet flow and quantity requirements only.

Material Specifications for Microbioretention. Below is the table of material specifications for microbioretentions.

Microbioretention Material Specifications

Material	Specification	Notes
Filter Media Composition	Filter Media to contain: • 80%-90% sand with >75% being coarse to very coarse • 10%-20% soil fines • 3%-5% organic matter in the form of plant based compost meeting Clearinghouse Design Specification #4, Section 6.5	The volume of filter media based on 110% of the plan volume, to account for settling or compaction.
Filter Media Testing	Plant available P within Low+ (L+) to Medium (M) per DCR 2014 Nutrient Management Criteria (18-40 mg/kg P for the Mehlich III procedure) and CEC >5	The media must be procured from approved filter media vendors.
Mulch Layer	Use aged, shredded hardwood bark mulch	Lay a 2 to 3 inch layer on the surface of the filter bed.
Geotextile/Liner	Use a non-woven geotextile fabric with a flow rate of > 110 gal./min./sq. ft. (e.g., Geotex 351 or equivalent)	Install on vertical sides of facility. Do not install on bottom of facility or between layers. Install under and on sides of pretreatment stone.
Choking Layer	3 inch layer of pea gravel or VDOT #8 stone which is laid over the underdrain stone.	
Stone Jacket for Underdrain and/or Storage Layer	1 inch stone should be double-washed and clean and free of all fines (e.g., VDOT #57 stone).	Minimum 6 inches or 12 inches if an underdrain is specified
Underdrains, Cleanouts, and Observation Wells	Use 6 inch rigid schedule 40 PVC pipe for microbioretentions, with 3/8-inch perforations at 6 inches on center, maximum of 3 rows of perforations; position each underdrain on a 1% or 2% slope located nor more than 20 feet from the next pipe OR none if soil infiltration requirements met (Level II design).	All microbioretentions are to have an observation well, cleanout or overflow pipe. Lay the perforated pipe under the length of the bioretention cell, and install non-perforated pipe as needed to connect with the storm drain system. Install T's and Y's as needed, depending on the underdrain configuration. Extend cleanout pipes to the ponding elevation above the surface with vented caps at the Ts and Ys.
Plant Materials	1 quart-sized perennial installed per 1-2 sf and 1 3-gallon shrub installed per 7.5 sf over entire ponding area from DEQ Specification 9: Table 9.5 or approved landscape plan	For Level 1 designs – choose either herbaceous and/or shrubs For Level 2 designs – choose any 2 of herbaceous, shrubs, or trees

Berm. Fill for the berm and overflow weir shall consist of clean material free of organic matter, rubbish, frozen soil, snow, ice, particles with sizes larger than 3 inches, or other deleterious

material. Fill shall be placed in 6-inch lifts and hand tamped. The berm shall be stabilized the same day it is installed, using either sod or matting.

Construction Installation. The installation and inspection of the construction of microbioretentions are to follow the Construction Inspection Checklist for Bioretention (See Appendix G). The checklist is to be included on the plan.

Maintenance Schedule. The table of maintenance activities for bioretention should be included on plans proposing microbioretentions.

Urban Bioretention (Planter Box)

An urban bioretention is a microbioretention that is installed in a container. The container can be poured in place concrete, or concrete block . The maximum drainage area to an urban bioretention is 2500 square feet. Larger drainage area may be allowed with sufficient flow controls and other mechanisms to ensure proper function, and safety. However, the urban bioretention filter must then be designed in accordance with the Level I bioretention filter criteria.

The proposed land cover to be used in the runoff reduction spreadsheet for an urban bioretention is managed turf.

Planter Box

A standard detail for urban bioretention – planter box and associated dry well is provided on the Stormwater Management Ordinance webpage (detail SWM#5). Plan views shall show the location of the overflow and inflow (downspout), and they shall be located as far apart as possible to limit short-circuiting.

Location. Long term maintenance and the health of the plants are critical to the function of planter boxes, therefore planter boxes cannot be installed beneath decks and other projections from the home, including cantilevered bump-outs, overhangs, fireplaces, AC units, etc. Release from detention tanks to multiple urban planter boxes **in series** requires pre-approval and may be considered only under extenuating circumstances.

Structure Design. The wall of the planter box can be constructed of a variety of materials provided that a structural engineer certifies the load is acceptable on the foundation on the architectural drawings reviewed and approved by ISD.

Downspouts connecting to planter boxes with greater than a three (3) story drop may be allowed when designed with sufficient energy dissipation.

The maximum height from the top of mulch elevation to the top of the planter box wall shall not exceed 15 inches.

Underdrain. The underdrain must discharge to a dry well and multiple underdrains must not discharge to the same location.

Dry Well Design. On single family home lots, planter boxes with impermeable bases shall outfall to a dry well designed for 25% of the required water quality volume for the planter box (use WQV for upstream planter box if in series). See Section 2.2.2 for dry well requirements.

Material Specifications. Below is the table of material specifications for stormwater planter boxes.

Planter Box Material Specifications

Material	Specification	Notes
Waterproofing	Watertight shell or impermeable liner	Must meet the specification of the Virginia Residential Code (208), R406.2 or most recent equivalent (except that liner options are not permitted). .
Filter Media Composition	Filter Media to contain: • 80%-90% sand with >75% being coarse to very coarse • 10%-20% soil fines • 3%-5% organic matter in the form of plant based compost meeting Clearinghouse Design Specification #4, Section 6.5	The volume of filter media based on 110% of the plan volume, to account for settling or compaction.
Filter Media Testing	Plant available P within Low+ (L+) to Medium (M) per DCR 2014 Nutrient Management Criteria (18-40 mg/kg P for the Mehlich III procedure) and CEC >5	The media must be procured from approved filter media vendors.
Mulch Layer	Use aged, shredded hardwood bark mulch	Lay a 2 to 3 inch layer on the surface of the filter bed.
Choking Layer	3 inch layer of pea gravel or VDOT #8 stone which is laid over the underdrain stone.	
Stone Jacket for Underdrain and/or Storage Layer	1 inch stone should be double-washed and clean and free of all fines (e.g., VDOT #57 stone).	Minimum of 9 inches for 4 inch underdrain
Underdrains and Overflows	Use 4 inch rigid schedule 40 PVC pipe with 3/8-inch perforations at 6 inches on center, maximum of 3 rows of perforations; position each underdrain on a 1% or 2% slope.	Lay the perforated pipe under the length of the planter box, and install non-perforated pipe as needed to connect with the storm drain system. Install T's and Y's as needed, depending on the underdrain configuration. Extend overflow pipe to the ponding elevation with atrium grate.
Plant Materials	1 quart-sized perennial installed per 1-2 sf and/or 1 3-gallon shrub installed per 7.5 sf over entire ponding area from DEQ Specification 9: Table 9.5 or approved landscape plan. For downstream planter boxes in series, a landscape plan designed for a drier hydrologic regime shall be submitted for review.	Choose either herbaceous and/or shrubs

Construction Installation: The installation and inspection of the construction of stormwater planter boxes are to follow the Construction Inspection Checklist for Urban Bioretention (See Appendix G). The checklist is to be included on the plan.

Maintenance Activities for Planter Boxes. The following is the list of maintenance activities for planter boxes. The table is to be included on plans proposing planter boxes.

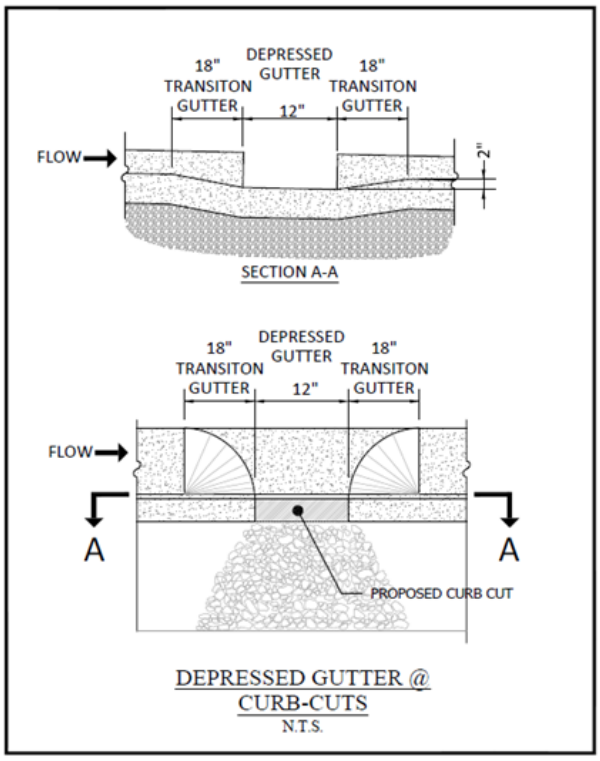
Planter Box Maintenance Schedule

Maintenance	Frequency
• Spot weeding, erosion repair, trash removal, and mulch raking	Twice during growing season
• Add reinforcement planting to maintain the desired vegetation density • Remove invasive plants using recommended control methods • Stabilize the contributing drainage area to prevent erosion	As needed
• Spring inspection and cleanup • Supplement mulch to maintain a 2-3 inch layer • Prune trees and shrubs • Examine for the ponding depth and adjust accordingly • Inspect inflows and overflow for erosion • Inspect for structural deficiencies and repair	Annually
• Remove sediment in pre-treatment cells and inflow points	Once every 2 to 3 years
• Replace the mulch layer	Every 3 years
• Inspected and certified by a professional licensed in the State of Virginia	Once every 5 years

Urban Street Bioretention

These systems are street level urban bioretention that take water from impervious surfaces such as roadways, sidewalks and plazas. No trees are permitted in these systems due to concerns about stability and longevity. Underdrains must discharge to the storm sewer network.

Inflows. Use following or equivalent for the curb cut detail:



Material Specifications. Urban Street Bioretentions shall use the Material Specifications for Bioretention Basins. The specifications table is to be included on the plan.

Construction Installation: The installation and inspection of the construction of urban street bioretentions are to follow the Construction Inspection Checklist for Urban Street Bioretention (See Appendix G). The checklist is to be included on the plan.

Maintenance Activities for Urban Street Bioretention. The maintenance activities are the same as Bioretention Basin. The schedule is to be included on the plan.

Design Specification No. 10: Dry Swales.

All of the design specifications are taken from the Clearinghouse Design Specification No. 10 with the following changes:

Material Specifications. Below is the table of material specifications for dry swales.

Dry Swale Material Specifications

Material	Specification	Notes
Filter Media Composition	Filter Media to contain: • 80%-90% sand with >75% being coarse to very coarse • 10%-20% soil fines • 3%-5% organic matter in the form of plant based compost meeting Clearinghouse Design Specification #4, Section 6.5	The volume of filter media based on 110% of the plan volume, to account for settling or compaction.
Filter Media Testing	Plant available P within Low+ (L+) to Medium (M) per DCR 2014 Nutrient Management Criteria (18-40 mg/kg P for the Mehlich III procedure) and CEC >5	The media can be procured from approved filter media vendors or mixed onsite with testing results meeting standard for both texture and nutrient composition.
Surface Cover	Turf or river stone.	
Top Soil	4 inch surface depth of loamy sand or sandy loam texture, with less than 5% clay content, a corrected pH of 6 to 7, and at least 2% organic matter.	
Filter Fabric	Use a non-woven polypropylene geotextile fabric with a flow rate of > 110 gal./min./sq. ft. (e.g., Geotex 351 or equivalent); Apply immediately above the underdrain only. Do not install at the bottom or between layers.	
Choking Layer	A 2 to 4 inch layer of sand over a 2 inch layer of choker stone (typically #8 washed gravel) laid above the underdrain stone	
Stone and/or Storage Layer	A 9 to 18 inch layer (depending on the desired depth of the storage layer) of #57 stone, should be double-washed and clean and free of all soil and fines.	
Underdrains, Cleanouts, and Observation Wells	Use 6 inch rigid schedule 40 PVC pipe with 3/8-inch perforations at 6 inches on center, maximum of 3 rows of perforations.	Install perforated pipe for the full length of the Dry Swale cell. Use non-perforated pipe, as needed to connect with the storm drain system.
Vegetation	Plant species as specified on the landscaping plan.	
Check Dams	Use non-erosive material such as wood, gabions, riprap or concrete. All check dams should be underlain with filter fabric and include weep holes. Wood used for check dams should consist of pressure-treated logs or timbers, or water resistant tree species such as cedar, hemlock, swamp oak or locust.	
Erosion Control Fabric	Where flow velocities dictate, use woven biodegradable erosion control fabric or mats (EC2) that are durable enough to last at least 2 growing seasons.	

Construction Installation: The installation and inspection of the construction of dry swales are to follow the Construction Inspection Checklist for Dry Swales (See Appendix G). The checklist is to be included on the plan.

Maintenance Activities for Dry Swale. The following is the list of maintenance activities for dry swales. The table is to be included on the plan.

Dry Swale Maintenance Schedule

Maintenance	Frequency
• Spot weeding, erosion repair, and trash removal.	Twice during growing season
• Add reinforcement planting to maintain the desired vegetation density. • Remove invasive plants using recommended control methods.	As needed
• Check to see if 95% turf cover or vegetation density has been achieved in the bed and banks of the dry swale. • Check for sediment buildup at curb cuts, gravel diaphragms or pavement edges that prevents flow from getting into the dry swale, and check for other signs of bypassing. • Check for any winter- or salt-killed vegetation. • Check inflow points for clogging or accumulated sand, sediment and trash, and remove it. • Inspect dry swale side slopes and grass filter strips for evidence of any rill or gully erosion, and repair it. • Check the dry swale for evidence of excessive ponding or concentrated flows, and take appropriate remedial action. • When sediment accumulation is noted, look for any bare soil or sediment sources in the contributing drainage area, and stabilize them immediately. • Check for clogged or slow-draining soil media, a crust formed on the top layer, inappropriate soil media, or other causes of insufficient filtering time, and restore proper filtration characteristics. • Inspect upstream and downstream of check dams for evidence of undercutting or erosion, and remove trash or blockages at weepholes.	Annually
• Inspected and certified by a professional licensed in the State of Virginia	Once every 5 years

Design Specification No. 11: Wet Swales.

All of the design specifications are taken from the Clearinghouse Design Specification No. 11.

Design Specification No. 12: Filtering Practices.

All of the design specifications are taken from the Clearinghouse Design Specification No. 12.

Design Specification No. 13: Constructed Wetlands.

All of the design specifications are taken from the Clearinghouse Design Specification No. 13.

Design Specification No. 14: Wet Ponds.

All of the design specifications are taken from the Clearinghouse Design Specification No. 14.

Design Specification No. 15: Extended Detention Dry Ponds.

All of the design specifications are taken from the Clearinghouse Design Specification No. 15.

2.3 Pollution Prevention Plan (P2 Plan)

A Pollution Prevention Plan (P2 Plan), required by County Code Section 60-9, shall be developed, implemented, and updated as necessary and must detail the design, installation, implementation, and maintenance of effective pollution prevention measures to minimize the discharge of pollutants.

At a minimum the P2 Plan shall include Sections 2.0, 5.0, and 7.0 from Appendix B including a detail for each practice proposed on the plans.

The following notes must be added to the plans to address Pollution Prevention:

- Only the following non-stormwater discharges are authorized by Arlington County's MS4 permit, unless the State Water Control Board or Arlington County determines the discharge to be a significant source of pollutants to surface waters: water line flushing (managed in a manner to avoid an instream impact); landscape irrigation; diverted stream flows; rising ground waters; uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20)); uncontaminated pumped ground water; discharges from potable water sources; foundation drains; air conditioning condensation; irrigation water; springs; water from crawl space pumps; footing drains; lawn watering; individual residential car washing; flows from riparian habitats and wetlands; dechlorinated swimming pool discharges; street wash water; discharges or flows from emergency firefighting activities; discharges or flows of potable water used in firefighting training activities managed in a manner to avoid an instream impact; and, other activities generating discharges identified by the Department of Environmental Quality as not requiring VPDES authorization.
- Appropriate controls must be implemented to prevent any non-stormwater discharges not included on the above list (e.g., concrete wash water, paint wash water, vehicle wash water, wash water containing detergents and/or chemicals, slurry/wash water from saw cutting operations, etc.) from being discharged into Arlington County's Municipal Separate Storm Sewer System (MS4) or stream network.
- Per Chapter 26-5. C of the Arlington County Code, it shall be unlawful for any person to discharge directly or indirectly into the storm sewer system or state waters, any substance likely, in the opinion of the County Manager, to have an adverse effect on the storm sewer system or state waters.

2.4 Registration Statement Requirements

For any construction activities resulting in land disturbance equal to or greater than one acre, applicants must submit a Registration Statement to Arlington County with the Stormwater Pollution Prevention Plan (SWPPP). The Registration Statement will be forwarded to DEQ for permit issuance when Arlington County approves the SWPPP. The applicant will pay the county portion of the permit fee at the DES Front Counter or online. DEQ will notify the applicant the amount of the fee and payment methods for state portion of the permit fee.

When the project is complete the applicant must submit a Notice of Termination to Arlington County.

2.5 Stormwater Facility Maintenance and Monitoring Agreement (MMA)

A Stormwater Facility Maintenance and Monitoring Agreement (MMA) is required for all regulated activities that propose a SWMF. A copy of the blank agreement is to be included on the plan sheets (see Appendix A for the agreement). An original, completed, signed, and notarized MMA needs to be submitted to the County at the time of SWPPP submission. The MMA is subject to review and may require resubmission in order to be approved.

2.6 Construction Operator Inspections

A Responsible Land Disturber (RLD) or DEQ certified stormwater inspector employed by the operator shall be onsite and conduct the inspections required by the SWPPP according to the schedule outlined on the approved plan (either once every 4 business days; or once every 5 business days and no later than 48 hours following 0.25" of rain within 24 hours as measured at an Arlington County approved data logging rain gauge).

2.7 Construction Record Drawing Requirements (As-built Certification)

Prior to issuance of the Certificate of Occupancy and closure of the LDA permit a construction record drawing must be submitted and approved.

This record drawing shall include:

1. As-built grading plan as outlined in Section 2.9.1.4
2. Certification letter.
3. Construction Inspection Checklist for each SWMF on the approved plan. Inspections shall take place, during construction of the stormwater facility, by a licensed design professional (civil engineer, land surveyor or landscape architect) using the corresponding construction inspection checklist (Appendix G) In accordance with standard practice, the actual inspections may be performed by an individual under responsible charge of the licensed professional. The licensed professional shall certify the facility if he/she finds that the facility was constructed in accordance with the approved plans. The sealed certification along with any material delivery tickets, photos and results of the tests and inspections shall be submitted to the County .

Appendix G contains templates of the certification letters, along with checklist and additional details based on project and facility type

2.8 Enforcement

Inspection reports from construction inspections conducted by Arlington County staff will be posted in Arlington County's electronic permitting system. Any required corrective action(s) and the date by which the action(s) needs to be taken will be documented in the report. Failure to address identified corrective actions within the specified time frame may result in a Notice of Violation (NOV). Failure to comply with the conditions of a NOV by the specified corrective action date may lead to issuance of a Stop Work Order and/or potential revocation of the LDA permit, per 60-17.B. Permit revocation will have the same effect as a Stop Work Order AND require the property owner to apply for a new LDA permit.

2.9 Requirements for Single Family Residences Built Separately

Single-family residences that are separately built, disturbing less than one acre and not part of a larger common plan of development or sale (including additions or modifications to existing single-family detached residential structures) shall be considered a regulated land disturbing activity. This section outlines the criteria that only these types of projects are allowed to use.

As announced in the March 26, 2021, Notice to Industry, effective September 13, 2021, unless a project meets the requirements of Sections 2.9.3 or 2.9.2, State stormwater quantity performance standards will be required, in addition to the stormwater quality performance standards already required. Stormwater quantity requirements and technical criteria are covered in Section 2.2.2, subject to certain limitations for single family homes built separately as outlined in that section.

Also effective September 13, 2021, all projects must:

- Implement soil de-compaction and amendment procedures to facilitate long term absorption and tree and other plant growth;
- Ensure runoff is not concentrated or released closely to downhill properties;
- Account for existing forested areas within a two (2) year window prior to LDA application (not required for 'Streamlined Method' projects);
- Address potential off-lot impacts from retaining walls and fill;
- Provide as-built documentation for site grading and trees (not required for 'Streamlined Method' projects); and,
- Meet the conditions for adding impervious surfaces after CO or project completion.

These requirements are covered in Section 2.9.1.

Single family residential projects may also:

- Obtain Level I permeable pavement credit for pavement designs with the twelve (12) inches of stone storage and no underdrain in soils that do not percolate at a rate >0.5 inch hour, provided they are designed to drawdown within 24 hours. This design is only applicable if the pavement is not receiving additional run-on from other pervious or impervious areas. Construction materials, installation and certification requirements are the same as described elsewhere. No soil infiltration testing is required, however the depth to the seasonal groundwater table is required. A standard detail for residential paver installations is provided on the Stormwater Management Ordinance webpage (detail SWM#2).
- Obtain Level 1 urban bioretention (planter box) credit for designs utilizing only 18" of soil media. Other design criteria, construction materials, installation and certification requirements are the same as described elsewhere.

To ensure runoff is not concentrated or released closely to downhill properties, all projects must also meet the Sheet Flow requirements (9VAC25-870-66 and 60-11.C); see Section 2.2.2.

Systems that rely solely on infiltration for release have high failure rates and accompanying burdens on builders and property owners at the end of construction. Projects that do not meet the requirements of Sections 2.9.3 or 2.9.2 and that propose infiltration systems must also provide a 'Plan B' compliance design with the permit application package that does not rely on infiltration systems. The only exception to this requirement is a Level 1 bioretention system downstream from a detention tank.

All other criteria in Chapter 2 of this Manual apply.

2.9.1 Additional performance requirements effective September 13, 2021

2.9.1.1 Soil de-compaction and amendment

With extensive research and peer review (including a study conducted in Arlington), Virginia Tech has established a 'soil profile rebuilding' (SPR) method for eligible portions of a site within the limits of disturbance. The 'B' horizon soils are de-compacted and four (4) inches of compost (organic matter) is added and blended, using a backhoe that loosens and mixes soil to a depth of two (2) feet (based on a representative depth of organic content in Virginia soils). The combination of organic matter and de-compaction encourage root growth, and the roots in turn help maintain soil permeability. A minimum four (4) inch layer of topsoil is then required to recreate the organic horizon (note that the State E/S specifications already require this topsoil layer).

Initially and over time, a healthy soil profile is 're-built' and permeability and vegetation growth are enhanced. The method also minimizes the expense of removal of soil and importing external soil to the site (although applicants can choose to excavate two (2) feet of additional soil and bring in new topsoil as an alternative).

Refer to Section 3.2.3 for the requirements for plan submission, construction, and documentation.

2.9.1.2 Account for existing forested areas within a two (2) year window prior to LDA application

Areas that meet the criteria for 'Forested Cover' in Section 3.2.2 must be entered as forested land cover in the VRRM spreadsheet:

The area of forest cover will be counted for a two (2) year window prior to LDA application, as determined by GIS analysis and other documentation.

2.9.1.3 Address potential off-lot impacts from retaining walls and fill

Installation of retaining walls can have significant negative impacts on local drainage patterns and adjacent properties, disrupting natural drainage flow paths and diverting and ponding water on neighboring properties.

All single family LDA permit applicants can choose the following option for the placement/extent of grading and retaining walls to minimize impacts to adjacent properties.

- A performance-based option with the objective to contain the impacts from retaining walls to the property being developed:
    - Retaining walls shall not be located within rear yard setbacks
    - Retaining walls shall not be located within two (2) feet from the public right-of-way or public sidewalk, whichever is more restrictive
    - Within side yard setbacks, retaining walls shall not extend beyond 20 feet from the principal structure nor be located closer than two (2) feet to the property line to minimize impacts to uphill neighbors from ponding water and to downhill neighbors from drainage weep holes. Limits to swale conveyance of offsite flow apply and subsurface pipe conveyance may be required.
    - Proposed slopes from the foundation meet but do not exceed the minimum required by building code.
- If an applicant does not choose this option, the applicant must demonstrate through plan, grading, and adjacent property details and analysis that there are no off-lot

drainage impacts either upgradient or downgradient from the proposed retaining walls and placement of fill. This documentation will be reviewed on a case-by-case basis. The expectation is that proposed fill/walls do not block existing flow paths and/or will not create and concentrate overflow impacts that are not handled on the lot.

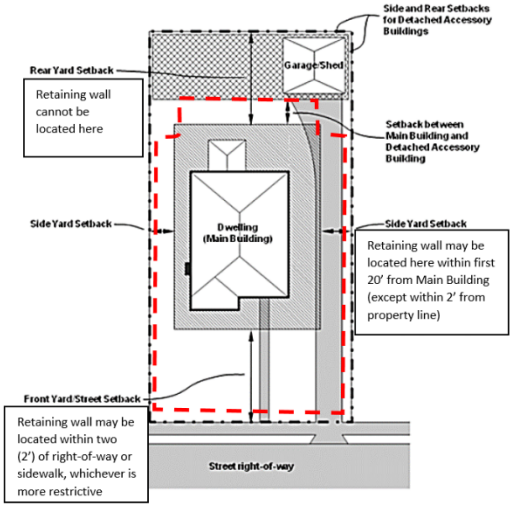


Diagram of retaining wall placement

2.9.1.4 As-built documentation for site grading and trees

A survey is required to document that the final grading on the site matches the approved plans. This critical step complements the existing requirement to document the construction of stormwater management facilities to ensure that the intended stormwater management outcomes of the approved plan are achieved—and to ensure success for homeowners.

The as-built grading plan submission requirements include, at minimum:

- As-built grading surveys show the final horizontal and vertical field location of constructed improvements in relationship with the engineered construction plans, design changes and contractor's field changes.
- As-built grading should be shown on the approved LDA grading plan sheet(s).
    - The break points of the drainage areas shall be identified on the plan through elevation points (at a minimum).
    - The new grade shall tie into the existing grade, also identified through elevation points.
- Any fence shall be located at least two (2) inches above final grade.
- Placing As-Built information upon a scanned image or other reproduction of the approved LDA plan sheet(s) showing approval stamp and P.E. seal is acceptable as long as, as determined by Arlington County, the quality, integrity, and legibility of the original drawings are substantially preserved without undue compromise.
- Include locations of conserved and planted trees, with species names.

2.9.1.5 Meet the conditions for adding impervious surfaces after issuance of a CO

Adding impervious cover after a single family home is completed occurs frequently based on staff research into LDAs approved in 2015 and 2016. This analysis found that approximately 25% of projects added patios and other surfaces after the construction of the new home. These

surfaces add runoff and often also create grade changes not accounted for in the approved LDA mitigation package that can both negatively impact adjacent properties and, incrementally, the downhill and downstream stormwater infrastructure and streams.

An LDA plan revision will be required for new impervious surfaces added after issuance of the CO where the impervious surface increase is the lesser of 10 percent of the impervious area treated under the approved LDA or 300 square feet of impervious area. This requirement is included as a note on the approved plan as well as reflected in the recorded Maintenance and Monitoring Agreement.

2.9.1.6 Exceptions

The Director will consider exception requests to the performance criteria for single family homes on a case-by-case basis where the following circumstances apply:

1. The proposed impervious area does not exceed the median impervious footprint of new homes (based on approved LDA records) for specific lot size categories, as shown in the table below;
2. The existing conditions on the site are mostly vegetated and also do not include a principal structure;
3. All roof areas are managed by water quality and/or quantity facilities;
4. Detention is prioritized in the 'downhill drainage area;' and,
5. Permeable paving material is provided for all non-roof impervious surfaces where groundwater and/or slope constraints do not apply.

   Generally, using permeable paving for narrow walkways is not very feasible. However, for projects that propose significant walkway footprints, a case-by-case evaluation will be made. Areaways and window wells are not required to be made permeable.

6. If a swimming pool is included with the project, the project is not eligible for an exception.

Lot size (SF)	Impervious cover limit for exception consideration
≤6,000	42%
6,001 to 8,000	40%
8,001 to 10,000	36%
10,001 to 15,000	34%
15,001 to 20,000	30%
>20,000	29%

If the above circumstances apply, an exception will only be granted if the following findings are also satisfied: (i) the exception is the minimum necessary to afford relief, (ii) reasonable and appropriate conditions are imposed so that the intent of the Act, the Regulations, and this chapter are preserved, (iii) granting the exception will not confer any special privileges that are denied in other similar circumstances, and (iv) exception requests are not based upon conditions or circumstances that are self-imposed or self-created. Economic hardship alone is not sufficient reason to grant an exception from the requirements of this chapter.

2.9.2 Alternative Compliance Option

Applicants may choose an Alternative Compliance Option to meet the stormwater quantity requirements of Section 2 in addition to stormwater quality requirements.

Tips and reminders for project success:

- Be sure to use the most up to date versions of the plan template and spreadsheet posted on the LDA website.
- Show all required elevations for facilities, including tanks.
- Be sure to choose your tank type early and carefully and fully understand all of the options for making connections to the tank.
- Pay attention to maximum release orifice size.
- Order tanks as early as possible.
- Follow all structural requirements for tank foundations.
- Pay attention to the required areas for soil profile rebuilding. Follow the detailed SPR instructions in this Manual.
- Follow all instructions for submitting as-built information for grading and SWMFs, paying special attention to submission and review timelines. Use OnBase for all submissions.

The performance criteria of this option include:

- Quantity: 3 inches detention from new impervious area for the site and within the 'downhill drainage area' (DDA). The DDA is the portion of the site that drains to adjacent properties before runoff reaches the public right-of-way and/or storm drain system. The portion of the site that drains directly to the public right-of-way and/or storm drain system is the 'non-downhill drainage area' (NDDA). There can be circumstances where the impervious surface increase in the DDA is greater than the impervious surface increase for the site. Also, credit from the DDA counts towards the site requirement.
- Quality: The more stringent of 75% of Virginia Runoff Reduction Method phosphorus reduction requirement or no net increase in phosphorus load. The spreadsheet automatically calculates water quality credits for DDA and NDDA tab facilities in the DAA, DAB, and DAC tabs.

For the DDA, there are two performance standards to meet:

- Detention for the total impervious increase (a).
- Detention for the roof area increase (b). A minimum of 50% of this detention volume must be provided through gravity detention tanks.
- If a>0 and b>a), b) defaults to the roof area equivalent to a)
- Where there are small (or no) increases in roof area in the DDA but there are overall impervious surface increases from paved areas, additional roof area detention, if available in the DDA, may be necessary along with the use of tanks to reach compliance. These circumstances will be evaluated on a case-by-case basis. A key factor will be whether the new DDA impervious areas are located closer to downhill properties.

Projects that choose this option shall use the standardized Alternative Compliance Option Plan Template posted on the LDA website to shorten the time for plan review and approval (please always check that you are using the most recent template version by downloading directly from the website). The Plan Template contains the computational methods and standard details and material specifications for the stormwater management facilities allowed for use under this option, including the new gravity detention tank tool.

There are two primary options for detention tank construction. Pre-manufactured tanks from vendors may be used or tanks may be constructed from poured concrete onsite, similar to a stormwater planter box. Concrete masonry units (CMUs) are not acceptable materials to construct a detention tank. Other detention tank construction techniques require review and approval. The same structural and Zoning requirements as currently govern stormwater planters apply to tanks. See Plan Template for further details. Underground detention systems are subject to the restrictions in Section 2.2.2.

Projects under the Alternative Compliance Option are also eligible to claim limited detention credits through tree conservation and/or planting. Swimming pools in the DDA that drain to the sanitary sewer system may be excluded from the impervious surface detention calculations for the DDA, depending upon the details of the sanitary connection, off-season pool runoff characteristics, and other factors to be determined during plan review. The swimming pool area still must be included in the total site impervious area calculations.

Systems that rely solely on infiltration for release (except for bioretention systems located downstream from tanks) are not permitted under the Alternative Compliance Option in order to avoid the increase in plan preparation and review time associated with providing the required 'Plan B' design as well as potential added time and cost at the end of construction from infiltration system failure.

A modified VRRM spreadsheet supports the Alternative Compliance Option. The spreadsheet instructions are provided below.

1. Site tab
    - Enter data as currently done

2. Compliance summary worksheet tab
   Enter:
    - Total for roof area and pavement area for site (to help track impervious areas available to manage)
    - Total impervious increase to downhill properties
    - Roof area increase to downhill properties

   The spreadsheet auto calculates all detention and water quality requirements as well as credit towards those requirements based on DDAs/NDDAs data entry. No data entry is required in the D.A. A, D.A. B, etc. tabs.

3. DDAs)/NDDAs tab
    - Required parameters and limits are automated.
    - Column A: Assign each Stormwater Management Facility (SWMF) to 1 of 2 possible downhill sub-drainage areas: 1 or 2. This is for general evaluation purposes during plan review. There are not separate performance requirements for each sub-drainage area.
    - For each SWMF, all required data is entered in that row, including impervious area, sizing, release, elevations

The details below include key highlights:

Practices that manage roof runoff

Tanks

- Maximum tank sizing is 3 inches for contributing drainage area
- Maximum release rate 0.01 cfs (4.5 gpm)
- Tank look up tables automate the computations based on tank geometry (can also accommodate non-uniform geometries by direct data entry)
- Tank release to dry well(s) sized for 10% of tank volume or to bioretention 1 or 2 for VRRM credit
- Release to bioretention adds 25% bonus to ponding detention credit. Release to multiple urban planter boxes in series requires pre-approval and will be considered only under extenuating circumstances.
- Release can also occur to bioretention 1 or 2 for VRRM credit

Planters

- Planters can be sized for up to 2 inches
- Dry wells for planters sized for 25% water quality volume
- Dry well release options: 100% void or stone
  - Max per excavation is 20 square feet, 3 feet deep
  - 100% void: max of four 50 gallon

Bioretention

- Manual entry of top and bottom surface area and calculation of ponding volume based on actual layout
- Detention credit for ponding volume; 25% bonus if downstream of tank

Detention only dry wells

- Maximum storage of one (1) inch per contributing roof area.
- B soils, 50% of available volume credit; C soils 40%, of available volume credit.
- 100% void style only required, subject to the limits established in Section 2.2.2, Sheetflow. Multiple entries may be used for the same downspout if the dry well limit per excavation is exceeded.
- Detention only and planter box dry well volume requirements may be combined in the same excavation, subject to the limits established in Section 2.2.2, Sheetflow. No detention credit is provided for required planter box dry wells.

Permeable paving

- Volume credit for 50% of stone storage

Trees

- Credit values for new and conserved trees are included in the compliance spreadsheet
- For DDA, credit is capped at 10% of DDA detention requirement
- If DDA credit is <10% of DDA detention requirement, NDDA credit allowed (subject to 10% cap for total site detention requirement)

The following suggestions are provided to facilitate planning design to achieve compliance:

1. Consider starting by adding the new trees and existing trees on the site that will be saved (in DDAs or NDDAs, as appropriate), essentially reducing the detention requirement for the rest of the site by up to 10%.
2. From there, the next step will depend on the relative overall, downhill, and downhill roof detention requirements. In general, one should start with the requirements with the fewest options for compliance and work toward the requirements with the most options:
    - For the DDA roof detention requirement, 50% **must** be through tanks.
    - For the 75% water quality requirement, the options are permeable pavement, planter boxes, and rain gardens. All three will give both quality and detention credit, but only planter boxes and rain gardens will give DDA roof detention credit.
    - Once the 50% tank and 75% water quality requirements are met, there are more options for achieving the full detention requirements:
        - Detention-only dry wells
        - Increasing the size of or adding more tanks and/or BMPs
        - Saving or adding more trees, if not already at the 10% cap

2.9.3 Streamlined Method

This approach is available for relatively moderate scale and scope single-family home projects. Land disturbance is calculated with the standard buffers currently in effect, and land disturbance of 2,500 square feet or greater will continue to be the primary regulatory trigger.

Three threshold measures are applied together to capture project scale and scope and impacts:

- Net impervious area increase is less than 750 square feet. This accounts for the new stormwater impact from the project.
- New and changed impervious area is less than 2,000 square feet. This accounts for the overall change in building configuration, grading and runoff patterns.
- Total impervious area on the lot is less than 3,200 square feet. This accounts for the total stormwater impact from the project.

For projects that fall below all three of these threshold measures, and do not require a Water Quality Impact Assessment (WQIA) under Chapter 61 (Chesapeake Bay Preservation Ordinance), the following simplifications of the SWPPP are allowed:

- A simplified Stormwater Management Plan using the Streamlined Method Plan Template on the LDA website (please always confirm that you are using the most recent template version by downloading directly from the website). This template has been updated following the completion of the initial pilot program. A new spreadsheet is also available on the website. No additional water quality or quantity computations or stormwater management facilities are required. An engineer's seal is not required.
- An 'Agreement-in-lieu of an Erosion and Sediment Control Plan' can be submitted, signed by the property owner.

All other requirements of the LDA permit continue to apply, including but not limited to a topographic survey and grading plan (sealed by a land surveyor), the Landscape Conservation Plan, the Pollution Prevention Plan, and the Stormwater Facility Maintenance and Monitoring Agreement. See the Streamlined LDA Permit Minimum Acceptance Criteria (MAC) Checklist on the website.

At the conclusion of the pilot period for this program, staff conducted a review of projects covered under this program to evaluate dry well performance and overall effectiveness at managing runoff on the site. A key finding from this evaluation is that many dry wells were undersized for their contributing roof area. As a result, consistent with requirements for all single family home LDA projects, all stand-alone dry wells must be sized for at least 0.5 inch but no more than 1.0 inch of rainfall from the contributing rooftop area. In addition, stand-alone dry wells must be the 100% void style systems.

Concentration of runoff from multiple downspouts to a single release location shall be minimized. The overall excavation footprint allowed for dry wells in any single location is limited to minimize the potential for soil compaction as well as overwhelming the infiltration capacity of the soil, as follows:

Type	Limit
100% void	No more than four 50 gallon dry wells

In addition, each dry well installation shall not be located any closer than five (5) feet from any other installation.

Please refer to the dry well details in the Streamlined Method Plan Template for all details and specifications that apply to these facilities.

The following summarizes the key steps for achieving compliance with the Streamlined Method.

Step 1:
Use Table 1 to determine minimum required storage volume required based on site impervious increase.

TABLE 1	
Impervious cover increase (SF)	**Minimum required storage volume (cf)**
0-99	10.0
100-199	22.0
200-299	29.0
300-499	51.0
500-750	77.0

Step 2:
Determine roof areas to each downspout in Downhill Drainage Area (DDA) and non-downhill drainage area (NDDA).

Step 3: Downhill Drainage Area (DDA) requirements

- Provide dry wells with minimum 0.5 inch rainfall sizing for each downspout in DDA
- Dry wells are required for each downspout in the DDA even if the volume provided exceeds the minimum site volume requirement.
- If providing dry wells with minimum 0.5 inch rainfall sizing for each downspout in the DDA does not meet the minimum site volume requirement, increase dry well volume until any of the following occur:

- Minimum site volume is met
- All dry wells are sized for maximum 1 inch rainfall
- Each downspout discharges to the maximum 4 dry well limit

- If required storage volume still remains, proceed to Step 4.

Step 4: Non-Downhill Drainage Area (NDDA) requirements
Provide additional dry wells with minimum 0.5 inch rainfall sizing for additional downspouts in the NDDA until the site detention volume is met.

Any remaining downspouts are required to discharge to a standard stone dry well (minimum two (2) feet wide by two (2) feet long by two (2) feet deep).

For projects that require a Water Quality Impact Assessment, the simplified Stormwater Management Plan applies ONLY if the project is considered 'allowable development ' under Section 61-7 of the Chesapeake Bay Preservation Ordinance. In addition, the impacts of specific impervious surfaces on the Resource Protection Area (e.g., driveway or rooftop runoff to a sloped area) will be evaluated as part of the WQIA review to determine if additional stormwater management measures other than dry wells must be installed.

Projects that require administrative or formal exceptions under Chapter 61 to increase impervious area and/or encroachment in the RPA must satisfy the full requirements of the LDA Permit and Stormwater Management Plan and are not eligible to use the Streamlined Method.

Due to the complexity of the Floodplain Management Ordinance, for projects that contain floodplain on the property, the applicant must contact the plan reviewer to determine what is required.

2.10 Fee Schedule

County fees for stormwater plan review and permitting are posted online. State established fees that local governments must charge for all regulated land disturbing activities have not changed since they went into effect in 2014. The State regulations require 28% of the fee to be remitted to DEQ for program oversight. The state portion of the fee should be paid separately to the state through the Construction General Permit process.

2.11 Bonds

With sole discretion, the Director may consider requests to post performance bonds to obtain a Certificate of Occupancy (CO) before Stormwater Management Facility (SWMF) as-built requirements, final stabilization measures, and tree and other vegetation planting requirements are satisfied only under the following circumstances:

1. SWMFs required under Chapter 60 or Chapter 61
   - Vegetation required for SWMFs cannot be planted because of circumstances outside the planting season.
   - Subdivisions: where required SWMF(s) are to be installed on an 'outlot' and the sequence of construction for the outlot SWMF(s) requires final stabilization of the SWMF drainage area(s) prior to construction.

   The Director will not approve the use of performance bonds for SWMFs that rely solely on infiltration due to the high failure rates of such systems at the end of construction.

2. Permanent stabilization measures required under Chapter 60

- Vegetative stabilization is unable to occur because of circumstances outside the planting season.
- Temporary stabilization measures must be installed—and inspected and approved by DES.

3. Tree and other planting required under Chapter 61
   - Planting is unable to occur because of circumstances outside the planting season.
   - Planting of trees on public property, if the project does not elect to post replacement funds in the Stormwater fund, per "Trees on public property", below

Before the Director will approve a performance bond, an amendment to the Stormwater Management Facility Maintenance and Monitoring Agreement (MMA) must be recorded to specify that the current landowner posting the bond retains the right of access and remains responsible for construction of the required SWMFs and, if applicable, planting of trees and other landscaping for the lot until DES approves the as-built certification for each SWMF.

The planting season is between September 15 – December 15 and March 1 – June 15.

The process can take 2-3 business days, please email StormwaterReview@arlingtonva.us to obtain a copy of the paperwork required. Letters of credit or cash deposits are the only types of surety accepted. The LDA permit is required to remain active until the SWMF as-built certification is accepted and the trees have been planted.

For each tree the bond amount posted shall be $700. For stormwater management facilities the amount of the bond posted shall include the price of labor and materials to be installed (including any removal if necessary) and the amount of the outstanding as-built certification. The estimate shall be line items and sealed by a professional (engineer, land surveyor or landscape architect). The estimate is reviewed by the County prior to acceptance. ***The use of the performance bond tool will not be available when construction schedules or closing deadlines did not account for SWMF construction requirements and timelines.***

2.12 Post Construction Inspection and Maintenance Requirements

Owners of SWMFs are required to maintain their facilities in accordance with the Maintenance and Monitoring Agreement and inspect their facilities annually. Letters will be mailed to owners in September reminding them of their obligations with a due date of mid-November. Inspection reports are to be submitted to the County using the online inspections forms and are required to include the following photos of the facility:

- Bioretention and planter boxes: three (3) photos are required.
  1. Close-up photo of the inflow/downspout discharge and splash block/rocks
  2. Facility's location with the home or building in the background
  3. Ponding depth (including a ruler)
- Permeable pavement: two (2) photos are required:
  1. Pavement's location with the home or building in the background
  2. Close-up photo of pavement showing approximately 10 pavers in the whole photo
- Dry Well: two (2) photos are required:

1. Close-up photo showing downspout that goes underground to connect with dry well.
2. Pop-up emitter's location with the home or building in the background.

- Infiltration trenches: two (2) photos are required:

    1. Close-up of the observation well with the cap removed
    2. Facility's location with the home or building in the background
- Underground detention: two (2) photos are required.
    1. Underground detention structure's location
    2. Close-up of the outlet structure showing that it is clear of any debris
- Manufactured facility: two (2) photos are required:
    1. Pavement's location with the home or building in the background
    2. Close-up photo of pavement showing approximately 10 pavers in the whole photo.

Failure of the owner to submit the required inspection report and photos for each facility will subject the owner to an inspection conducted by the County and the owner will be back charged the costs. Owners that fail to submit complete inspection reports, including all the required data and photos for each facility, could also be subject to an inspection conducted by the County and the owner will be back charged the costs. Additionally, failure of the owner to complete any required maintenance to the facilities will result in the County performing the maintenance and the owner will be charged those costs. The following administrative fees will also be charged:

- Inspection administrative fees: $100
- Maintenance administrative fees: $200

3 Landscape Conservation Plan Requirements

A Landscape Conservation Plan must be submitted and approved before any demolition or clearing and grading may occur on a lot or parcel. This plan and any revisions must be prepared and certified by a certified arborist or landscape architect. Major alterations to an approved landscape conservation plan, such as changes to the limit of disturbance or construction footprint, removal of conserved trees, or adjustments to tree species or planting locations, require plan resubmission and approval prior to issuance of a certificate of occupancy. Minor preservation or planting changes, such as modification to fencing or other landscaping, shall be cleared by the County Urban Forester, before proceeding.

In addition to this section, a Tree Conservation Guidelines, Tree Notification Letter Example and a Landscape Conservation Plan Checklist are available as guidance.

The General Performance Standards for Development in Chesapeake Bay Preservation Areas (§ 61.10.A-C) will be applied to review of Landscape Conservation Plans. In accordance with § 61.10.A-B, the limit of disturbance, inclusive of the construction footprint and all utilities and stormwater infrastructure, shall be minimized to provide for tree conservation. Tree conservation shall be maximized to meet the tree canopy requirements of § 61-10.C**.**

For projects in the Resource Protection Area requiring a major Water Quality Impact Assessment, the landscape conservation element (§ 61.12.C.3) shall be addressed through the Landscape Conservation Plan. Additional requirements, over and above those outlined in this section, may be imposed as authorized by the Chesapeake Bay Preservation Ordinance, to protect water quality.

On a project-by-project basis, as deemed necessary by the County Urban Forester at the plan review stage to ensure implementation of the approved Landscape Conservation Plan, the County Urban Forester may require an independent private project arborist to monitor a site and provide monthly reports (until deemed unnecessary by the County Urban Forester) on tree conservation and planting.

3.1 Plan Requirements for 4.1 Site Plan and Other Conditioned Projects

For site plans subject to conditions requiring tree replacement, such as plans governed by Arlington County Administrative Regulation 4.1, and conditioned use permits, the Chesapeake Bay Preservation Ordinance Landscape Conservation Plan requirement shall be satisfied by the submission of the standard Tree Protection/Replacement Plan and Landscape Plan currently required under 4.1. The following additional requirements for 4.1 site plans also apply:

The 4.1 Tree Protection/Replacement Plan must include the Resource Protection Area (RPA) delineation (Section 1.1.1), if an RPA exists on the site. If an RPA exists on the site, additional information also may be required, as outlined in Section 4 of this guidance manual.

The 4.1 Landscape Plan must satisfy the 4.1 tree replacement requirements and the Chesapeake Bay Preservation Ordinance tree canopy coverage requirements and must include a delineation of the post-development tree canopy at 20 years maturity. If the 4.1 tree replacement requirements do not satisfy the Chesapeake Bay Preservation Ordinance tree canopy requirements, additional trees must be planted to meet the canopy requirements. Projected 20-year tree canopy area for each tree to be planted must be included in the Planting Schedule table.

For 4.1 site plans, and other conditioned projects, the entire canopy of street trees planted within the project property lines, in accordance with the approved 4.1 Landscape Plan, including any canopy area over the public right-of-way, may be counted towards the Chesapeake Bay Preservation Ordinance canopy requirements for the site.

3.2 Plan Requirements

3.2.1 Landscape Conservation Plan

For all projects subject to the plan of development process under § 61-13 (including Use Permits) a Landscape Conservation Plan shall be prepared and submitted that meets the requirements below.

- Landscape Conservation plans shall be to scale, with a north arrow and be clearly legible.
- For projects under 1 acre of disturbance, plans shall be drawn to a minimum scale of 1:10.
- Plans shall consist of at least: a tree protection plan, a tree planting/landscape plan, and a page for details and letters, on separate sheets. More sheets may be needed to convey the required information.
- Include the ISA certification(s) or Landscape Architect accreditation number(s) of the preparer(s).
- The Resource Protection Area (RPA) delineation (see Section 4.3) shall be provided on all plans, including the tree protection plan and tree planting/landscape plan, if applicable.

3.2.2 Tree Protection Plan

In accordance with § 61.10.B, tree conservation shall be provided to the maximum extent practicable. The limit of disturbance, inclusive of the construction footprint and all utilities and stormwater infrastructure, shall be minimized to maximize conserved tree canopy. This is achieved through showing:

- All existing trees and other woody vegetation on the site of three (3) inches or greater diameter at breast height (DBH, 4.5 feet above grade), including species type and current condition as a numerical rating from 1 to 100 (per the Guide for Tree Appraisal, 10th Edition).
- Shade the area of tree conservation clearly on the plan.
- All tree conservation areas shall be free of invasive vine species on trees, and mulched with wood chips or shredded hardwood mulch, except where native vegetation is present. Show the areas of invasive control and mulching on the plan.
- If a separate limit of work is proposed on your project, clearly distinguish between Limit of Disturbance (LOD) and Limit of work (LOW, where only access is needed). Use different line types for these.
- Where there are groups of trees, the entire stand may be delineated as a whole rather than individual trees. However, the critical root zones for the stand shall reflect the actual composition of the stand and the species composition of the stand shall be provided in tabular form, with percentages of species composition.
- Conservation of all trees outside of the construction footprint, except invasive and high-risk trees (condition rating ≤ 50 percent), and trees unlikely to survive construction, to the maximum extent practicable.
- All trees and other woody vegetation three (3) inches or greater DBH proposed to be removed and the reason for removal (e.g., construction footprint, sight lines, disease, etc.).
- All trees and other woody vegetation three (3) inches or greater DBH proposed to be protected and retained, outside the construction footprint, along with the tree protection measures taken to ensure protection during clearing, grading, and all phases of construction.
    - The critical root zone shall be determined and shown for all on-site and adjacent off-site trees and woody vegetation according to the Tree Protection Detail for Determining Critical Root Zone in Appendix F (DPR Design Standards).
    - In accordance with § 61-10.B, tree protection measures must include protective barriers at or beyond the critical root zone of each tree to be protected, to the maximum extent practicable. Encroachments into the critical root zone of protected trees that are necessary for the proposed use or development shall include appropriate mitigation measures as defined in the Tree Protection Guidelines, as deemed necessary.
    - The location of existing and proposed utilities shall be shown and impacts from these utility installations to existing and proposed trees shall be minimized.
    - On the tree inventory table, identify the percentage of critical root zone and structural root zone (5 times the size of the trunk, measured from the edge of the trunk) impacted. Where trees are 30% or more impacted, or have any impact to the structural root zone, these trees may not be counted for tree canopy. If the critical root zone is deemed to not represent the actual location of the tree's roots, and there is a desire to count the conserved tree for tree canopy, show how root impact is minimized through alternative root protection methods, or

provide alternative drafts of where the critical root zone may be, if buildings and other barriers may restrict the spread of roots.
    - Trees of condition 50 or lower cannot be counted for tree canopy
    - For residential single-family home projects, tree protection shall be a minimum 4' chain link fence mounted on vertical pipes driven 2' into the ground with no gates. All other projects, such as 4.1 site plans, other special exception projects, and parks and infrastructure projects require a minimum of 6' high chain link fence. Where tree protection and silt fence are in line, super silt fence may substitute for chain link fence. Trenchless silt fence must be used in areas where the critical root zone of any conserved tree overlaps the tree protection fence, unless otherwise specified by the stormwater inspector and urban forester. Tree protection fencing in forested areas may deviate from the fence type requirements subject to the approval of the Urban Forester.
    - Tree protection notification signs in English and Spanish must be posted on each protective barrier, similar to the details provided in Appendix F (DPR Design Standards). Printed and laminated signs can be used, if affixed securely and replaced if damaged.

Jointly-owned and trees on adjacent properties: Location of the critical root zone for any jointly-owned trees and trees on adjacent properties along with protective barriers, closing access to the tree protection area, at or beyond the critical root zone, to the maximum extent practicable if it extends onto the site.

- Encroachments into the critical root zone of jointly-owned trees or trees on adjacent properties that are necessary for the proposed use or development shall include appropriate mitigation measures such as root matting.
- Where construction activities encroach into the critical root zone of jointly-owned trees or trees on adjacent property, property owners are required to notify joint or adjacent property owners in writing by certified mail. Notification shall include contact information for the sender, a description of any possible tree impacts and a copy of the plan. Arlington County projects will follow current public engagement processes, which will include impact notification to neighbors, in lieu of this notification requirement.
- The responsibility for resolving any jointly-owned or adjacent property tree issues shall be with the owner.
- Jointly-owned trees shall not be shown as to be removed, or have any significant impact shown to their structural root zone (within 5 times the trunk diameter, away from the trunk edge) on the plan until written and signed approval from adjacent property owners has been obtained.

Trees on public property: Public trees shall be properly protected to the maximum extent practicable. Where public trees cannot be properly protected as part of the project, permission for removal must be obtained from the Urban Forester in accordance with Chapter 67 of the County Code and replacement shall be in accordance with the County's tree replacement guidelines and Administrative Regulation 4.3: Tree Planting on Public Land.

- Approval of the plan is contingent on the payment or posting of bonds for tree planting. If another requirement (such as conditions or civil engineering plan requirements) already

requires the posting of bonds for tree replacements, this requirement does not apply.

Two options can be used for tree replacement:

Option 1: Pay $700 per replacement tree into the Stormwater Fund.

Option 2: Plant trees in the planting season, with a bond, at $700 per replacement tree, to be released, if the tree survives, 1 year after planting. This bond defaults into the Stormwater Fund if the tree does not survive.

Trees in the Resource Protection Area (RPA): RPA trees shall be conserved, except as reasonably necessary to enable allowable development, modifications or encroachments in the RPA in accordance with § 61.7, as determined by the Director. Additional RPA-specific Landscape Plan requirements are identified in Section 4.4.3.

Forested Cover: Show forested areas on the plan, and include these in the stormwater pre-redevelopment calculations where the site area in the VRRM spreadsheet includes forested areas.

- Landcover shall be considered "Forested", when: At the time of permit application, tree canopy covers an area of at least 3,000 square feet with an understory of vegetation that is not managed turf. Any understory vegetation contributes to forested cover, including non-native species..
- Per Section 2.9.1.2, forested areas, including understory vegetation, removed in the last 2 years shall be reflected as "Forested" in the stormwater pre-redevelopment calculations, to best reflect changes in the hydrologic conditions of the site where forest cover has been removed.

Tree canopy calculation shall also be subject to the following conditions:

- Total canopy area is calculated as the sum of conserved canopy and projected 20-year canopy for new trees.
- Determination of the tree canopy at 20 years maturity shall be in accordance with the tree canopy coverage information in Appendix E, Recommended Trees with Canopy Credits. This information is based on data compiled by the Virginia Nursery and Landscape Association. Cultivars or species not included on the 20 Year Canopy Coverage list require review by the County Urban Forester. Canopy credit, if granted, will be based on published documentation of size in 20 years.
- At the discretion of the County Urban Forester, the canopy of existing trees to be protected on the site may not be counted towards the post-development canopy requirement if there are significant encroachments into the critical root zone of such trees that substantially threaten tree survival. Where encroachments will impact 30% or more of the critical root zone of a conserved tree, the plan shall provide for minimization of root impacts through alternative root protection methods, or identify why the critical root zone may not reflect the actual location of roots (such as due to overlap of critical root zones or the location of existing structures).
- To further encourage conservation of existing trees and account for future canopy growth, a 2.0 canopy area credit may be applied to the canopy area of existing trees to be protected on the site for trees with a Medium, Medium-Large or Large canopy size, if the County Urban Forester determines those trees are sufficiently protected (see

Appendix E). Trees identified in Appendix E as having a Small or Small-Medium canopy size will not receive this credit. Trees that are neither native, nor invasive (such as *Catalpa spp.*), and not shown on Appendix E may be counted, but do not receive any additional conservation canopy credit.

- If trees not eligible for canopy calculations are present in a delineated stand (such as invasive or low condition trees) or if the stand contains non-invasive, non-native trees (such as *Catalpa spp.)*, provide percentages of composition of eligible and ineligible canopy in tabular form.
- Tree canopy credit shall not be counted for tree species designated as invasive on the Non-Native Invasive Plants of Arlington County, Virginia list.
- The canopy of existing understory trees will not be credited where such trees are completely beneath the canopy of existing overstory trees on the same property.
- The canopy area of trees on adjacent properties may not be counted towards the canopy requirement, unless: a.) such trees are County-designated Heritage, Specimen, or Memorial trees in accordance with Chapter 67; or b.) the canopy area of such trees covers more than 50% of the site.
- Tree canopy (conserved or planted) cannot be obstructed by overhead structures, to be counted for tree canopy.
- Any public easement located on private property beyond the public right-of-way, such as a public street right-of-way, may be subtracted from the total site area in determining tree canopy coverage requirements. For example, for a single-family home parcel, there may be a public easement for sidewalk beyond the street right-of-way which could be subtracted. For a new subdivision with a new public street, any public easement beyond the street right-of-way may be subtracted, but not the area of the street itself, since this is part of the overall development footprint of the project which will likely have impacts on existing trees. If areas are subtracted, trees conserved in these areas shall not be counted for canopy calculations.

3.2.3 Tree Planting/Landscape Plan

Unless a special exception condition exists that delays the submission of the Landscape Plan, all LDA permits shall include a Landscape Plan, including permits for demolition only.

The Tree Planting/Landscape Plan shall include:

1. All vegetation proposed to be planted after construction. Proposed planting shall be shown on the plan and detailed in a Plant List, with scientific names and sizes in tabular form.
    - **Species Selection: The** Plant List shall provide diversity to ensure the 20-Year Tree Canopy coverage. When ten (10) or fewer medium, medium-large and/or large trees are proposed, a maximum of three (3) trees of each species shall be specified. A single species cannot constitute the entirety of the plant list if more than one (1) tree is to be planted. When more than ten (10) medium-large and large trees are to be planted, the plant list shall include a minimum of five (5) species with the number of trees distributed evenly, unless otherwise approved by the County Urban Forester. Plantings over 40 trees need to maximize diversity. Coordinate with the project Urban Forester.
    - To encourage planting of native species, new native trees will receive a 1.25 canopy area credit. A native plant is defined as a plant that is indigenous to northern Virginia. Cultivars of native species may also receive the canopy credit bonus for natives, based upon published documentation of mature size, unless otherwise determined during review by the County Urban Forester. New native

trees planted within the RPA may be counted towards the tree canopy requirement, but do not receive the canopy credit bonus.

- The Plant List shall not include any species found on the Non-Native Invasive Plants of Arlington County, Virginia.
- **Spacing:** The Plant List shall include plant spacing for trees, shrubs and ground cover plants.
  - Newly planted trees may not be planted closer together than 10 feet for small and small-medium trees, 15 feet for medium trees, 20 feet for medium-large trees and large trees, unless otherwise approved by the County Urban Forester. Small canopy trees can be interplanted with large canopy trees (such as American Linden – 10 feet – White fringetree – 10 feet – American Sycamore)
  - Where there is a desire for more closely planted trees as a hedge, the 20-year tree canopy for the hedge can be valued as 10 square feet per 5 linear feet of hedge, to a maximum of 150 square feet.
  - Locate tree planting according to these spacing requirements, unless otherwise approved by the Director, from other features:
    - Structure: 10 feet for large and medium-large canopy, 5 feet for Medium and smaller
    - Utilities: Five (5) feet for all trees
    - Property lines: Three (3) feet for all large and medium-large canopy trees
    - Stormwater facilities: 10 feet for large and medium-large canopy trees, 5 feet for Medium and smaller
    - Sidewalks and other pavement: 5 feet for all trees, except tree pits, landscape strips and medians.
- Caliper of planted trees shall meet minimum standards noted in Appendix E, not to exceed four (4) inches caliper, to be counted, unless approved by County Urban Forester.
- When trees and other required landscape materials cannot be planted within the planting season (October 1 – March 31), a planting deferral may be required by the County Urban Forester. A bond, equivalent to the cost required to plant and maintain any deferred landscaping for two years shall be posted, as part of the stormwater bond, to be released after planting and inspection by the County Urban Forester. See Section 2.11 for more information.

2. Calculation of the post-development tree canopy at 20 years maturity to determine compliance with the minimum tree canopy requirements of § 61-10.C.

3. Provide Soil Profile Rebuilding (SPR) information. Helpful tips for success can be found at: https://www.arlingtonva.us/files/sharedassets/public/building/documents/soil-profile-rebuilding-questions-and-answers.pdf

   Requirements for plan submission:
   - Provide volume of compost required: area x 4” depth.
   - Provide volume of topsoil required: area x 4” depth
   - Note areas where SPR will occur on the plan (Soil Profile Rebuilding exhibit in the Alternative Compliance Option Plan Template), using the Soil Profile Rebuilding specifications (https://sres.frec.vt.edu/).

        - For all utilities (existing and new) in gravity flow pipes or conduit, SPR to be provided to a depth of six (6) inches above. For pressurized pipes, SPR to be provided to a depth of 12 inches above.
        - Soils shall not be compacted at final grade above new utilities. Working SPR amended soils on either side of the utility zone by hand into the utility zone may be necessary.
        - For isolated areas smaller than 10 square feet, only the surface soil layer shall be decompacted with a tiller, to four (4) inches, amended with compost, and topped with four (4) inches of topsoil.
        - Where slopes exceed 3:1, only follow step three from the specification (replace or add topsoil) and show how benching will be used to maintain stability.
        - Drainage swales outside of side yards may be graded per normal practice to meet final grade after SPR occurs.

    - Areas that may be excluded:
        - All impervious areas
        - Within five (5) feet of home foundations
        - Within one (1) foot of driveways, parking areas, and other impervious areas not captured by the home foundation
        - Swales in side yards (8 or 10 side yard situations, not wider side yards)
        - Within one (1) foot of other structures, including but not limited to retaining walls, porches, etc.
        - In tree protection areas (including where root matting is used, and other areas where roots are properly conserved).
        - Within one (1) foot of sump discharge pipe
        - Areas with widths below two (2) feet.
- Requirements for compost amendment material:
    - Compost feedstock shall be mature and stable, and be composed of leaves, yard waste, or food waste. Biosolid-based composts shall not be used.
    - A compost sample with analysis shall be made available to the County, at request.
    - The compost shall:
        - Be free of weed seeds
        - Be free of heavy metals
        - Have an electrical conductivity of less than 4.0 mmhos/cm
    - The topsoil shall follow standards in the SPR specification, or as approved by the County. A list of approved vendors is posted on the County website: https://www.arlingtonva.us/files/sharedassets/public/building/documents/lda-compost-topsoil-sources.pdf
- Requirements for construction and documentation:
    - Follow the steps in the specifications: https://sres.frec.vt.edu/
    - Conduct SPR before installation of any utilities that will be located within two (2) feet of surface and just prior to final grading.
    - Documentation:
        - Provide materials receipts documenting acceptable types and required volume of compost and soil material.
        - Provide photographs of equipment incorporating compost to depth of two feet in the areas shown on the approved plan.
            - Step 1: Compost installation

        - Step 2: Tilling
        - Step 3: Topsoil installation
    - County acceptance, which may include on-site verification by County Inspector, is required.

4. Soil Volumes
    - All on-site planted trees shall have at least 300 cubic ft of soil, calculated 3 feet below proposed grade. Show soil volume calculations in tabular form, if trees are planted in restricted spaces (such as tree pits, planters)
    - All street trees shall follow soil volume standards set out in Administrative Regulation 4.3

3.2.4 Details and Correspondence

The Details and Correspondence sheet on the plans shall include:

- All relevant details for the project, including protection fencing, root damage mitigation (such as root matting), soil remediation, and signage. Many example details can be found in Appendix F (DPR Design Standards).
- The Standard Tree Conservation and Planting Notes found in Appendix F (DPR Design Standards).
- Copies of all agreements with neighboring parties
- Copies of letters to neighbors, with copies of certified mail receipts (non-Arlington County projects only)

3.3 Requirements Before and During Construction

- Alterations to an approved Landscape Conservation Plan, such as changes to the limit of disturbance or construction footprint, removal of conserved trees, or adjustments to tree species or planting locations, require plan resubmission and approval prior to issuance of a Certificate of Occupancy. Conservation or planting changes that do not significantly impact existing trees or planted trees, such as modification to fencing or other small landscaping, shall be cleared by the County Urban Forester, before work proceeds.
- Tree planting procedures shall be in accordance with the Tree Planting Detail found in Appendix F (DPR Design Standards).
- Material shall meet or exceed qualities set out in ANSI standards for Nursery Stock, Z60.1
- When conserved tree condition changes significantly during construction, even due to situations outside of the control of the applicant, the County Urban Forester may require resubmission of the plan.
- Tree protection fencing must be installed and inspected after a pre-construction meeting with the County Urban Forester and prior to any land disturbing activity (including utility work or vegetation clearing) on the property.
- All tree protection fencing shall remain in place until all activities involving construction vehicle movement on the site, the stockpiling of materials on the site, or clearing, grading, landscaping, digging, or trenching on the site have ceased or until the time of final site stabilization, whichever occurs last.

- Tree protection areas shall have all non-native invasive vines removed at the end of the project. Where healthy native vegetation is not present, the protection area shall be covered with shredded hardwood mulch, or other organic mulch as approved by the County Urban Forester.
- Field changes can be made by the County Urban Forester, where reasonable field changes will improve tree conservation and/or planting survival.
- Remove all tags, stakes, labels, and other material from trees at the time of project completion, unless otherwise directed by the Urban Forester.
- Provide Soil Profile Rebuilding documentation required in Section 3.2.3:

3.4 Violations and Mitigation

- Trees shall not be removed from the site prior to permit approval.
    - Trees removed before permit approval shall be replaced according to the Arlington County Tree Replacement Guidelines, on top of the percentage tree canopy required for the site.
    - Any tree that cannot be replaced on the site will require a payment into the Stormwater Fund according to current tree replacement guidelines calculations.
    - Exception: If a tree is deemed to be at an Imminent risk of failure, using TRAQ guidelines.
- Trees noted on the plan for conservation on an approved plan shall not be removed, without permission of the County Urban Forester.
- Trees on public property cannot be damaged in any way, without approval from a County Urban Forester.
    - Any damage will be assessed by a County Urban Forester, and damages will be assessed according to the Tree and Shrub Ordinance (Chapter 67).

3.5 Exemptions

Dedicated school sites, playing fields, or other non-wooded public recreation areas, and other facilities and uses of a similar nature are exempt from the tree canopy coverage requirements outlined in § 61-10.C, but are required to submit a Landscape Conservation Plan. A Landscape Conservation Plan is not required for activities exempt from the Chesapeake Bay Preservation Plan of Development Requirements (§ 61-13, see Section 1 below).

4 Resource Protection Area Requirements

This Section provides an overview of requirements for Resource Protection Area (RPA) projects regulated under the Chesapeake Bay Preservation Ordinance. Please also refer to the Chesapeake Bay Preservation Ordinance website for additional information.

The flowchart in Section 4.2 outlines the overall process for complying with RPA requirements, including when an exception is required. Section 4.5 discusses the activities that require an exception.

If a RPA exists on a site, an RPA delineation and a Water Quality Impact Assessment (WQIA) are required. See 'How to Apply' and sections below for additional information.

Generally, a WQIA is required under Section 61-12 of the ordinance for:

- Any proposed land disturbance or development within an RPA, including development permitted under § 61-7.A

- Any RPA buffer modification or encroachment, including modifications or encroachments permitted under § 61-7.B or C (Section 4.8).
- Any proposed land disturbance or development on slopes greater than or equal to 15 percent located adjacent to the landward boundary of the RPA buffer
- Exempted activities under § 61-15, including passive recreation facilities and associated amenities (e.g., trails, boardwalks, bike paths etc.), natural resource conservation, and historic preservation (Section 4.9)

A streamlined WQIA submission is also required for development activities on sites that disturb less than 2,500 sf (Section 4.7).

A WQIA may also be required for development outside of the RPA, depending on the nature of the development and the potential impacts on water quality.

Home gardens, individual home repairs and routine home maintenance are allowed in the RPA without a WQIA unless these activities involve the creation of impervious cover, the disturbance of at least 2,500 square feet of land, or the removal of trees with a diameter of at least three (3) inches.

4.1 Resource Protection Area

The Resource Protection Area (RPA) is defined in Section § 61-5 of Arlington County's Chesapeake Bay Preservation Ordinance.

The RPA includes:

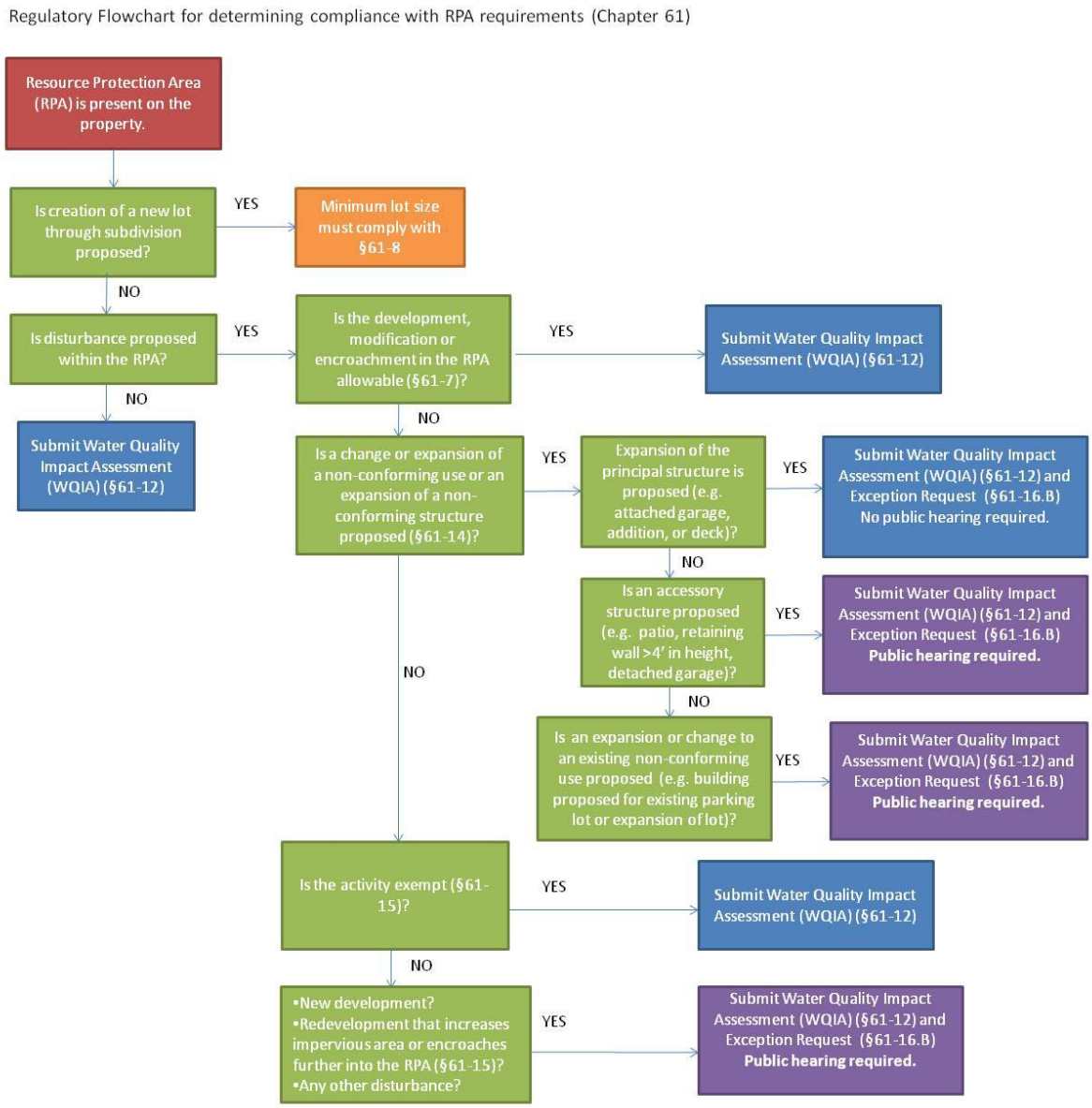
- tidal wetlands and shores,
- non-tidal wetlands contiguous to tidal wetlands or perennial streams
- natural stream channels (ephemeral, intermittent and perennial)
- man-made open stream channels
- a minimum 100 foot buffer adjacent to these water bodies
- steep slopes greater than or equal to 25 percent contiguous to the 100 foot buffer
- contiguous steep slopes greater than or equal to 15 percent in the Potomac Palisades area of the County from Chain Bridge to the County boundary (as well as other such areas as may be designated by the County Board under § 61-5.B.1.e).

The County's adopted Chesapeake Bay Preservation Areas Map (January 2018), serves as a guide to the general location of RPAs so that property owners can determine if an RPA exists on a given property.

- View the Interactive Watersheds and RPA Map

Arlington County's adopted CBPA map includes contiguous steep slopes 25 percent or greater as determined using a digital elevation model (DEM) based on 2-foot contour interval topography. Due to limitations of this model, the RPA delineation (see Section 4.34.4.1) may vary from the mapped RPA.

4.2 Flow Chart for Resource Protection Area Compliance



4.3 Subdivision Plats

If RPA exists on a lot or lots proposed for subdivision, the RPA delineation (Section 4.4.1) must be shown on the plat. Per § 61-8, any lot subdivided after October 1, 1989 must have sufficient area outside the RPA to accommodate the intended development, unless the development can be considered allowable under § 61-7.A.

The following note must also be added to each plat:

The landward component of the Resource Protection Area buffer shall consist of an undisturbed 100-foot wide buffer of vegetation, which shall be retained if present and established where it does not exist. Land development may be allowed in the Resource Protection Area only if it is water dependent or constitutes redevelopment and the criteria for allowable development in Arlington County Chesapeake Bay Preservation Ordinance Section 61-7.2 have been met.

4.4 Plan Requirements for Projects Disturbing ≥ 2,500 square feet

Projects disturbing 2,500 square feet or greater are subject to the plan of development process (§ 61-13). The mechanism for compliance review is submission for a Land Disturbing Activity (LDA) permit. Compliance review for RPA requirements occurs in conjunction with the LDA review, and results in LDA permit issuance.

The LDA 2.0 RPA template is intended for use by single-family home project applicants and may be modified and used by all projects. Sheet RPA1 contains the information required for all RPA submissions. Sheets RPA2 and RPA3 may be necessary if a project requires an exception (Section 4.5) or meets the criteria for a major Water Quality Impact Assessment (§ 61-12.C). If a project disturbs 5,000 square feet or greater in the RPA or disturbs the 50 feet adjacent to the protected waterbody (the seaward 50 ft), a major WQIA may be requested.

4.4.1 RPA Delineation

All submissions regulated by the plan of development process must include a site-specific RPA delineation if an RPA exists on the site. The site-specific RPA delineation will be reviewed for compliance with the minimum lot size requirements for new lots (§ 61-8; see Section 4.3) as well as to determine if an exception request is required for the proposed development. In accordance with § 61-5, ephemeral, intermittent and perennial streams are protected by RPA in Arlington County. The site-specific boundaries of the RPA must be identified by the applicant and approved by County staff. The site-specific delineation of RPA boundaries must be conducted in accordance with the Resource Protection Area: Onsite Buffer Area Delineation guidance document provided by the Virginia Department of Environmental Quality (DEQ) The location of this boundary on all submitted plans must be performed by a professional land surveyor according to accepted surveying techniques. An exception is made for plans involving <2,500 square feet of land disturbance (a delineation procedure for these sites is in Section 4.7).

All steep slopes of 25 percent or greater contiguous to the minimum 100' RPA boundary must also be delineated on the site plans. The RPA boundary is extended to include these contiguous slopes. Slopes adjacent to the minimum 100-foot RPA boundary must be surveyed in the field by a professional land surveyor according to accepted surveying techniques (except for plans involving <2,500 square feet of land disturbance).

In accordance with § 61-12.B.1, which requires a Water Quality Impact Assessment for disturbance of slopes greater than or equal to 15 percent located adjacent to the landward boundary of the RPA buffer, such slopes must also be delineated on the site plans as described in the preceding paragraph.

The field-determined RPA boundary must be shown on the existing conditions plan, the grading plan, the erosion and sediment control plan, the stormwater management plan, the landscape conservation plan; and on any RPA specific plan sheets. The name and license number of the professional surveyor who performs the site-specific RPA delineation must be provided on the plan, along with the date of survey and any of relevant information about the survey methodology.

4.4.2 Water Quality Impact Assessments

All Water Quality Impact Assessments (WQIAs) require submission of the basic information required in § 61-12.B.

The WQIA must include:

- a scaled site drawing
- the required RPA notes and:
- The Water Quality Impact Assessment Data Sheet (Appendix C)

The WQIA Data Sheet is the standard form provided to submit the required project information. The submitted WQIA Data Sheet must be complete for permit approval and issuance.

The scaled site-drawing and WQIA Data Sheet together must provide the:

- Location of the RPA
- Location and nature of the existing and proposed encroachment into the RPA buffer
- Area of pre- and post-development impervious surfaces in the RPA and on the site with stormwater calculations if appropriate
- Type and location of proposed best management practices to mitigate the proposed encroachment
- Location of existing and proposed downspouts, swales, runoff outfalls or drainage pathways from the property;
- Location of existing vegetation onsite, including the number and type of trees and other vegetation to be removed in the RPA buffer
- Re-vegetation or vegetation enhancement plan that supplements the existing RPA buffer vegetation in a manner that provides for pollutant removal, erosion and runoff control.

If necessary, applicable civil engineering or landscape plan sheets should be referenced in the Water Quality Impact Assessment Data Sheet.

Projects that propose to disturb more than five thousand (5,000) square feet in the RPA or that propose encroachment into the seaward fifty (50) feet of the RPA buffer may be required to submit the additional information authorized under § 61-12.C for Major WQIAs depending on the nature of the activity proposed, site conditions, and potential water quality impacts (e.g., steep slopes, sensitive ecological areas, etc.).

Measuring RPA Encroachment, Land Disturbance, and Impervious Cover

For the purposes of the WQIA, encroachment is expressed as a distance, usually from a structure to the stream or other water body. The edge of the defined streambed or ordinary high water line serves to mark the boundary of the water body. For projects proposing modification or expansion of the primary structure, the location of the existing principal structure, including attached structures such as decks or garages, will be used to determine if an increase in encroachment is proposed. The location of detached structures or accessory uses including but not limited to tool sheds, detached garages, retaining walls, gazebos, pools, patios, and terraces will not be considered for these projects. Additional guidance on non-conforming structures and uses is provided by DEQ.

Land disturbance is defined under § 61-3, and includes grading, removing, filling, disturbing or dredging of soils, clearing or grubbing of vegetation, or paving or removal of pavement.

Impervious cover is defined under § 61-3, and includes roofs, buildings, parking areas, streets and any other asphalt, concrete or compacted gravel or dirt surfaces. Unmortared brick or flagstone surfaces set in sand are also considered to be impervious. Swimming pools are also considered to be impervious cover. See Section 2.2.1.1 for conditions governing impervious cover removal prior to permitting.

Upon Arlington County's review of the WQIA, modifications to these proposed projects may be required such as tree protection, erosion and sediment control, and tree replacement to ensure that water quality is protected.

RPA Vegetation Removal as part of Land Disturbance Permit

The removal of trees in the RPA in conjunction with land disturbance or development is limited to that reasonably necessary to enable allowable development, modifications or encroachments in the RPA in accordance with § 61.7. Trees with a diameter of at least three (3) inches removed from the RPA as result of land disturbance or development must be replaced in the RPA with trees in adherence to Arlington County's Tree Replacement Guidelines. Tree replacement within the RPA is required even when, through conservation of canopy or planting outside the RPA, the tree canopy requirements of § 61-10.C are otherwise met.

In addition, per § 61-18.A.4, trees with a diameter of a least three (3) inches removed from the RPA without Arlington County approval must also be replaced with species of the same or comparable value as determined by the Tree Replacement Guidelines.

Special requirements apply to landscape plans for RPA sites:

- RPA trees must be specifically identified in the tree inventory.
- Limb or root pruning of RPA trees must be minimized to the extent possible, and RPA trees that must be pruned shall be identified on the tree protection plan.
- All efforts shall be made to conserve and retain existing RPA trees. Justification shall be provided for each proposed RPA tree removal, and the number and replacement value of RPA trees to be removed shall be quantified in accordance with the Tree Replacement Guidelines and clearly presented on the plan.
- Where forested RPA areas are disturbed, reforestation shall be provided. Reforestation must include multiple layers of native vegetation including trees, shrubs, and ground layer plants (Section 4.6.2).
- To offset a new RPA encroachment, reforestation of an equivalent RPA area may be required.

During construction, RPA tree removal and pruning shall be overseen by an ISA-certified arborist, and shall not be undertaken except as authorized by the County Urban Forester.

4.5 Exceptions

The Chesapeake Bay Preservation Ordinance classifies some RPA activities as allowable (§ 61-7), other activities require specific approval through an exception process. This section identifies common RPA activities that require an exception and describes the process for requesting an exception. Projects that require an exception should include relevant sections of Sheets RPA2 and RPA3 of the RPA template.

What Activities are Allowed in the RPA Without an Exception?

The following are the typical activities in Arlington that are allowed in the RPA without an exception, subject to the County's review and approval of a WQIA.

- Redevelopment, as long as impervious cover within the RPA does not increase and there is no further encroachment in the RPA buffer.
- New development, where there would otherwise be a loss of buildable area on the lot because of the RPA buffer. The buildable area size allowed for such development shall be similar in use and scope to structures in the surrounding neighborhood or area.
- Public roads and utilities.
- Minor trimming and clearing of vegetation for reasonable sight lines and vistas, as described in § 61-7.B.
- Exempted activities under § 61-15, such as passive recreation facilities and associated amenities (e.g., trails, boardwalks, bike paths etc.), natural resource conservation, and historic preservation.
- Fence projects and retaining walls less than four (4) feet in height, provided they do not inhibit or alter flow or require the removal of trees with a diameter of at least three (3) inches.
- Sheds and gazebos, placed in areas of existing turf less than 100 square feet in size.

4.5.1 What Activities in the RPA Require an Exception?

The following are the typical activities in the RPA in Arlington that require an exception request and approval, along with an approved Water Quality Impact Assessment, to occur:

- Expansion of structures or uses currently located partially or fully in the RPA buffer (non-conforming uses), such as building an addition, deck, or garage for an existing home or expanding an existing parking lot.
- Expansion of an existing structure currently located outside the RPA buffer into the RPA buffer, such as building an addition, deck, or garage for an existing home.
- Redevelopment that involves removing an existing structure currently located partially or fully in the RPA buffer and building a new structure which encroaches farther into the RPA buffer, has a larger footprint in the RPA than the existing structure, or adds impervious cover within the RPA.
- Redevelopment that involves removing an existing structure currently located outside the RPA buffer and building a new structure which encroaches into the RPA buffer.
- New development which encroaches into the RPA buffer, except where the RPA buffer results in a loss of buildable area (see Section 0 above).
- Redevelopment that changes the existing use in the RPA buffer, such as constructing a commercial building within the footprint of an existing parking lot.
- New accessory structures or uses such as patios, detached garages, firepits, seating areas, or outbuildings, or expansions of existing accessory structures or uses.
- Retaining walls exceeding 4 feet in height and 1 foot in width. Retaining walls that exceed these dimensions or involve creation of additional impervious cover, disturb more than 2,500 square feet, or remove trees of at least three (3) inches, are considered detached accessory structures and are subject to the Chesapeake Bay Preservation Ordinance Review Committee (CBORC) exception process.

4.5.2 Exception Requests Process

Requests for exceptions to the requirements of the Chesapeake Bay Preservation Ordinance (Chapter 61) must be made in writing using the Exception Request Form (Appendix D). Certain exception requests must be reviewed by the Chesapeake Bay Ordinance Review Committee (CBORC) and heard at a public hearing. In particular, CBORC will review requests for exceptions to the requirements of:

- § 61-7 (Allowable Development, Modifications, and Encroachments in RPAs)
- § 61-14.C.3 (requests to construct, expand or modify nonconforming accessory structures or uses in the RPA buffer)

The Director shall review all other exception requests. Administrative exceptions include requests to modify nonconforming principal structures in the RPA buffer under § 61-14.C.1 (e.g. additions, decks or garages on an existing home) and requests for exceptions to § 61-10 (General Performance Standards for Development).

For exception requests to modify nonconforming principal structures in the RPA buffer to be heard by the Director, at least 70 percent of the principal structure must remain intact and the modification must be compatible in bulk and scale to those in the surrounding neighborhood or area, as determined by the Director. If these criteria are not met, the modification shall be subject to the exception request requirements for redevelopment under 61-16.A, which require review by CBORC.

For exception requests involving proposed activities in the RPA, the WQIA will be the primary tool to evaluate the request. In addition, for these and other exception requests, CBORC or the Director will review each request based on the criteria in § 61-16.C.

Public notification is also required for all exception requests submitted to CBORC, according to the requirements of § 61-16.D.

4.6 RPA Mitigation and Buffer Enhancement Requirements

Projects that impact the Resource Protection area must propose a RPA mitigation plan. The mitigation plan identifies construction and post-construction practices to improve water quality that is commensurate with or offsets the project's impact. Post-construction water quality improvement in the RPA may be accomplished with landscape and/or stormwater management practices that reduce runoff and minimize erosion. Such practices include but are not limited to rainwater harvesting (with a use plan), rain gardens, pervious surfaces, soil improvement, tree canopy improvements, conversion of lawn to native vegetation, invasive plant removal and downspout disconnection. Sheet RPA2 of the LDA 2.0 RPA template provides a framework for RPA mitigation plans.

The requirements of § 61-12.A for a net improvement in RPA vegetation, i.e buffer enhancement, also apply to all RPA development proposals. The buffer enhancement requirement may be fulfilled through invasive plant management, tree canopy improvements, and/or riparian buffer planting.

4.6.1 Mitigation and Buffer Enhancement Guidance for single family home projects

Mitigation and buffer enhancement plans are project specific. However, the general guidelines below have been provided to assist in the development of appropriate buffer vegetation improvement and mitigation plans. The listings under "Mitigation" and "Buffer Enhancement" below may not all be required for every project. Alternately, additional mitigation or buffer enhancement requirements not listed below may be required based on site-specific water quality concerns.

If a project requires a Major WQIA or is requesting an exception, the RPA mitigation or buffer enhancement provided must be listed on the RPA Mitigation Table on Sheet RPA2. RPA mitigation that is required to maintained and inspected for the long-term also must be identified on the Stormwater Management Facility Information Table on Sheet SWM-2 of the LDA 2.0 template.

Typical Mitigation and Buffer Enhancement Requirements associated with RPA impacts for Single Family Home projects

RPA Impact	Mitigation (Typical)	Buffer Enhancement (Typical)	Long-term maintenance requirement
1. No disturbance in RPA	• Energy dissipation for concentrated flow • Additional erosion control during construction	Removal of English ivy from RPA trees	No
2. Allowable development (RPA impervious cover and encroachment do not increase)	• Reduce impervious cover (if feasible) • Increase distance between structure and stream (if feasible) • Tree replacement • Tree protection • Supplemental erosion control during construction • Energy dissipation for concentrated flow • Downspout disconnection	• Tree canopy enhancement • Invasive plant management during construction	No
3. Allowable development – *Major WQIA required	See #2 above • Riparian buffer planting (perennials, shrubs, and trees) • Ongoing invasive plant management	See #2 above Also addressed via required mitigation	Project specific**
4. Administrative exception - (project increases RPA encroachment or impervious cover)	See #2 above • Riparian buffer planting (perennials, shrubs, trees) equivalent to impact area may be required • Ongoing invasive plant management • Additional SW controls may be required	See #2 above Also addressed via required mitigation	Project specific**

5. Administrative exception – *Major WQIA required	See #4	See #4	Yes
6. CBORC exception	See #4	See #4	Yes

*A project meets the criteria for a major WQIA if the project results in disturbance of ≥5,000 sf in the RPA or impacts the 50 ft of the RPA adjacent to the protected waterbody.

**See examples provided in the RPA Template (Sheet RPA2)

4.6.2 Re-vegetation and Buffer Enhancement Plan Elements

Tree replacement and tree canopy enhancement proposals for Resource Protection Area properties should primarily be addressed through the Landscape Conservation Plan (Section 3). Projects proposing riparian buffer planting consisting of multiple layers of vegetation (groundcovers, perennials and shrubs as well as trees) or long-term invasive plant management are required to provide supplemental Water Quality Impact Assessment documentation for these proposed activities. Sheet RPA2 is provided for this purpose.

Invasive Plant Management

Invasive plant management on RPA properties is intended to enhance and improve the overall condition of forested areas within the RPA to meet the requirements of §61-12.A or to offset impacts to water quality. Conservation of existing trees through the removal of English ivy (*Hedera helix)* and other invasive vines that compromise the health and longevity of existing trees can significantly improve the condition of streamside forests and support their ability to process nutrients and remove sediment from runoff. Removal of English ivy and other invasive plants from the ground layer of a forested area can enable re-vegetation with native plants by eliminating competition with similar result. However, it is critical to evaluate whether removal of invasive plants from the groundlayer will result in erosion, particularly on steep slopes. Invasive plant management may require phased removal (typically from upslope to downslope) and, if necessary, supplemental planting to ensure water quality is protected.

Invasive plant management for RPA properties falls into the following major categories, which relate to specific long-term maintenance and as-built requirements.

- Invasive Plant Management – English Ivy on Trees
- Invasive Plant Management – Vines on Trees
  removal requirement includes English ivy as well as additional invasive vines such as oriental bittersweet (Celastrus orbiculatus), Japanese or Chinese wisteria (Wisteria spp.); Japanese honeysuckle (Lonicera japonica), etc.
- Invasive Plant Management – English ivy
  removal requirement includes removal of ivy from trees and in the groundlayer.
- Invasive Plant Management – General
  removal requirement extends to all plants on the Non-Native Invasive Plants of Arlington County, Virginia list

Invasive plant management may be physical or chemical depending upon the target species for removal and the site. Chemical applications must be the least toxic necessary for the work and undertaken by a Virginia-certified pesticide applicator or registered technician.

The invasive plant management plan shall include:

- A scaled drawing identifying the area subject to the plan
- Invasive Plant Management Notes appropriate for the site and species targeted for removal
- Appropriate Maintenance Schedule; and
- As-built requirements (photos, receipts, etc.)

Sample Invasive Plant Management Notes, and the required maintenance and as-built requirements are available on the Chesapeake Bay Preservation Ordinance website and on Sheet RPA2 of the LDA 2.0 RPA template.

During construction, authorization to proceed with plant removal must be obtained at the Stormwater Management Pre-Installation Meeting or obtained from the Stormwater Inspector. Removal of English ivy may also be authorized by the Urban Forester.

Riparian Buffer Planting Plans

Only native plants may be planted in the Resource Protection Area. For the purpose of this document, a native plant is defined as a plant that is indigenous to northern Virginia. Cultivars of native plant species may not be used for habitat restoration, reforestation and mitigation within the RPA or adjacent to natural areas or parkland except as approved by the Director. In the RPA, cultivars of natives may be used for foundation plantings, special trees and other principally landscaping elements.

Resources for selecting native plant species for RPA projects include**:**

- Recommended Trees with Canopy Credits (Appendix E)
- Recommended Trees and Shrub Species for the Reforestation of Resource Protection Areas
- Plant NOVA Natives
- Virginia Department of Conservation and Recreation's Riparian Buffer plant list
- Keeping It Natural!, a natural areas planting guide for Arlington County and Alexandria; and
- the Virginia Digital Plant Atlas

Proposals to convert lawn to forested areas or to re-establish natural areas within the RPA should provide a planting plan that includes the multiple layers of vegetation common in Mid-Atlantic forests: groundcovers/perennials; shrubs; understory trees and overstory trees. The type and density of plantings must be in accordance with the Riparian Buffers Modification & Mitigation Manual's Restoration/Establishment Table A (p. 94).

Arlington County will also accept plans conforming with the buffer area establishment requirement outlined in Fairfax County's Chesapeake Bay Preservation Ordinance (Section 118-3-3 (f)), which requires 100 overstory tree, 200 understory trees and 1089 shrubs to be planted per acre. Groundcovers/perennials should be planted to achieve soil coverage of 80 percent at their mature size.

A Resource Protection Area planting plan must include the following:

- A scaled planting plan depicting the areas for seeding and groundcover/perennial planting, and identifying the species, number and location of woody plants.
- A plant schedule, specifying the quantity, common name, scientific name, spacing and size for woody plants and the mature cover provided for groundcover/perennial plantings
- the Riparian Buffer Planting Notes
- the appropriate Maintenance Schedule; and the
- As-built requirements

Planting plans for projects that disturb 5,000 square feet or greater, or encroach into the 50 feet adjacent to the stream (known as the seaward 50 feet), and therefore meet the criteria for a major WQIA, must be certified by a licensed arborist or landscape architect.

Sample Riparian Buffer Planting Notes, and the required maintenance and as-built requirements for buffer plantings are available on Sheet RPA2 of the LDA 2.0 RPA template.

During construction, authorization to proceed with plant removal must be obtained at the Stormwater Management Pre-Installation Meeting or obtained from the Stormwater Inspector. Removal of English ivy may also be authorized by the Urban Forester.

4.7 Projects Disturbing Less Than 2,500 Square Feet in the RPA

Projects involving less than 2,500 square feet of land disturbance in the RPA are not subject to the Plan of Development review process in § 61-13. However, the RPA requirements apply to all projects in the RPA regardless of the area of disturbance.

Projects disturbing less than 2,500 sq. ft must submit a Water Quality Impact Assessment Data Sheet (Appendix C) and a scaled site drawing, but are not required to provide an RPA delineation or topographic survey prepared by a professional surveyor. For WQIA information, please see Section 4.4.

An annotated property plat including any proposed improvements at scale or comparable may be provided to meet the requirement for a scaled site drawing.

The RPA boundary depicted on the Interactive Watersheds and RPA Map or un-surveyed field delineation of the RPA boundary performed by the homeowner or their agent must be included on the annotated property plat.

Property owners or their agents may use DEQ's RPA delineation guidance to delineate the RPA boundary:

1. Measure the minimum 100' RPA boundary at three locations on the parcel (at each edge and in the middle);
2. Mark these locations with flags and measure the distance of each flag perpendicular to the property line or other feature shown on the property's plat (e.g., house, driveway, etc.)
3. Relate and show the RPA boundary can on the property's plat.

For properties with steep slopes, please email rpareview@arlingtonva.us for guidance.

For projects disturbing less than 2,500 square feet, WQIA submissions are reviewed and should be provided concurrent with building permit submissions. If a building permit will not be filed, the Appendix C: WQIA Data Sheet can be submitted directly to rpareview@arlingtonva.us.

4.7.1 Mitigation and Buffer Enhancement

Projects disturbing less than 2,500 square feet on RPA properties are subject to the mitigation requirements incorporated in § 61-7 and § 61-12.

Projects that will:

- Add impervious cover within the RPA
- Increase encroachment within the RPA,
- Remove natural vegetation in the RPA buffer
- Remove or impact the critical root zone of trees three (3) inches in diameter or greater within the RPA buffer, or
- Disturb 500 square feet or greater within the RPA

are required to demonstrate an on-site overall net improvement in RPA buffer vegetation or riparian habitat and/or a net reduction in pollutant loads.

RPA mitigation requirements may be accomplished with landscape or stormwater management practices that reduce runoff and minimize erosion. Such practices include but are not limited to rainwater harvesting (with a use plan), rain gardens, pervious surfaces, soil improvement, tree canopy improvements, conversion of lawn to native vegetation and downspout disconnection.

Erosion and sediment control during the active phase of the construction should be implemented.

Where the area of disturbance for a project is less than 2500 square feet but greater than 2000 square feet, the limits of the area of disturbance must be physically demarcated on the site and certified by a licensed professional engineer, surveyor, or architect. For additional information, please contact the DES Development Services Bureau at (703) 228-3629, TTY (703) 228-4611 or stormwatermanagement@arlingtonva.us.

4.8 Buffer Modification and Discrete Tree Removal

In certain circumstances, property owners may desire to manage their forested RPA buffer through pruning or to enable access. Allowable modifications to RPA buffers are described in § 61-7.B. Minor trimming and clearing of vegetation for reasonable sight lines and vistas and the creation of access paths up to 4 feet in width is allowable upon review of a WQIA data sheet and the required site plan. A WQIA for a proposed modification to the RPA buffer must include the information required in § 61-7.B.4.

Landowners may remove noxious vegetation, including non-native invasive plants, poison ivy and poison sumac, at their discretion. However, vegetation that is removed must be replaced with other vegetation equally effective at limiting runoff and preventing erosion.

RPA property owners may also identify RPA trees that are dead, diseased or hazardous. Dead, diseased or dying trees in the RPA may be removed by the property owner following submission of an arborist's report to the County and subsequent acceptance of the report by the County. Reports may be submitted to rpareview@arlingtonva.us.

Dead, diseased or dying trees with a diameter of a least three (3) inches removed from the RPA under § 61-7.B are required to be replaced within the RPA at 1:1 (1 tree replacement for each tree removed). At the discretion of the Director and in specific circumstances, this requirement may be waived, for example, for removals of dead trees in a natural forested area with significant existing canopy cover.

Approval from Arlington County is required for the removal of healthy trees with a diameter of 3 inches or greater in the RPA. Appendix C: WQIA Data Sheet requesting tree removal must be submitted by email to rpareview@arlingtonva.us with information on the number, size and species of trees, and reason for removal, along with a proposed planting location for replacement of the tree being removed. A condition assessment from a Mid-Atlantic Chapter – International Society of Arboriculture (MAC-ISA) certified arborist should be included in the removal request. For resources on finding an arborist visit https://goodtreecare.com

Please see FAQ link for additional info.

4.9 Exempted Activities

The most common activities in Arlington exempted under § 61-15 of the Chesapeake Bay Preservation Ordinance include public roads (built separately from development projects regulated under § 61-13) and utilities such as electric and gas lines, fiber optic cables, etc. However, these exemptions are contingent upon construction, installation, operation, and maintenance practices that minimize water quality impacts.

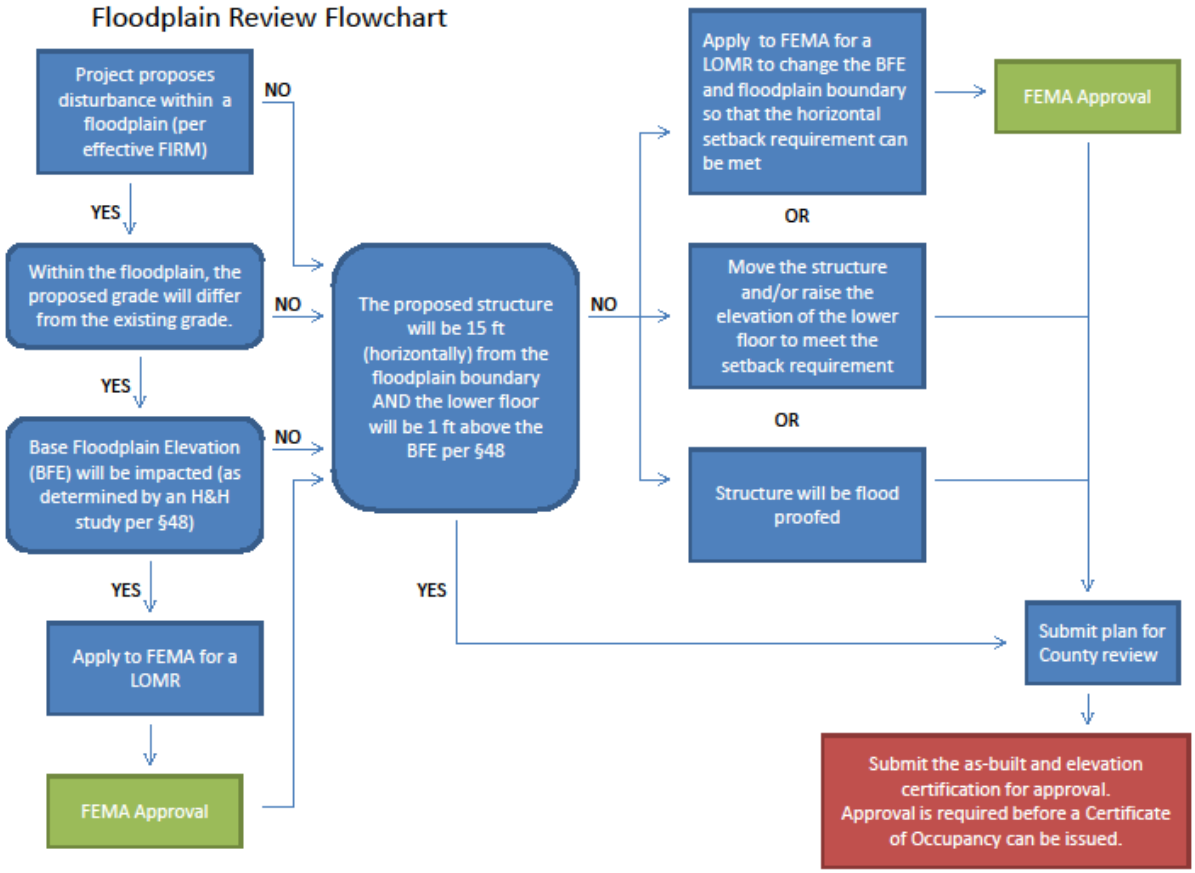
Passive recreation facilities such as boardwalks, trails, and pathways also may be exempt from RPA requirements. A WQIA must be submitted for such activities that demonstrates that these activities will not deteriorate water quality, as required by § 61-15.

A WQIA for a proposed public road in the RPA buffer (an exempted activity) must demonstrate that the alignment and design prevent or minimizes RPA encroachment and minimizes adverse effects on water quality. A WQIA for any exempted activity under § 61-15.B or C also must demonstrate that the intended use will not deteriorate water quality. The WQIA should include erosion and sediment control, and riparian buffer re-planting (Section 4.6) in cases where vegetation is removed.

Federal properties are exempt from RPA requirements. However, federal projects must adhere to the General Performance Standards of § 61-10.

5 Floodplain Requirements

A floodplain is any land area that is susceptible to being inundated by unusual and rapid accumulation of water from any source. The Floodplain Ordinance in Chapter 48 of the Arlington County Code regulates development in flood zones. A Floodplain Development Permit may be required. Before building, filling or excavating in a floodplain, or near any natural or man-made watercourse, please contact Arlington County at des@arlingtonva.us or 703-228-4488. The information regarding the review process and requirement can be found in the Floodplain Review Flowchart. The effective Federal Emergency Management Agency (FEMA) floodplain map can be found on FEMA's webpage. For general information, including status information on periodic updates to the County's floodplain maps, please visit the Floodplains and Flood Insurance Rate Maps webpage.


Floodplain Review Flowchart
Project proposes disturbance within a floodplain (per effective FIRM)
NO
YES
Within the floodplain, the proposed grade will differ from the existing grade.
NO
YES
Base Floodplain Elevation (BFE) will be impacted (as determined by an H&H study per §48)
NO
YES
Apply to FEMA for a LOMR
FEMA Approval
The proposed structure will be 15 ft (horizontally) from the floodplain boundary AND the lower floor will be 1 ft above the BFE per §48
NO
YES
Apply to FEMA for a LOMR to change the BFE and floodplain boundary so that the horizontal setback requirement can be met
FEMA Approval
OR
Move the structure and/or raise the elevation of the lower floor to meet the setback requirement
OR
Structure will be flood proofed
Submit plan for County review
Submit the as-built and elevation certification for approval.
Approval is required before a Certificate of Occupancy can be issued.