

# Stormwater Retrofit to Foxridge Apartments

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## Motivation

The Town of Blacksburg is addressing stormwater issues by implementing the Stormwater Enterprise Fund, a utility fee on properties with impervious area that contribute to stormwater runoff (expected in 2015). Property owners will be billed \$6/month for every 3,300 ft<sup>2</sup> of impervious area, or "stormwater billing unit" (SBU).

The Stormwater Enterprise Fund will include a credit system that offers up to 50% reduction of the utility fee to encourage stormwater management.

The stormwater utility fee for the Foxridge Apartment complex in Blacksburg, VA could be as high as \$22,000/yr.

The purpose of this project was to design a stormwater management retrofit for one tax parcel of Foxridge. The project goals were to design stormwater best management practices to control stormwater peak flows, reduce the phosphorus loads in accordance with state stormwater regulations, and achieve a 40% reduction in the stormwater utility fee to be owed by Foxridge.

## Existing Site Orientation



### Foxridge Apartment complex

- 77 acres
- Developed in 1970s
- Little to no stormwater management infrastructure

### Phase V: Project Area

- 1.8 acres
- 52% impervious area from two building roofs and parking lot

## Objectives

- Achieve 1- and 2-year stormwater **quantity** control (10% utility fee credit each).
- Achieve stormwater **quality** control (20% credit).
- Develop bioretention maintenance plan.
- Ensure no net-maintenance cost for Foxridge management.
- Develop design drawings.

## Standards Used

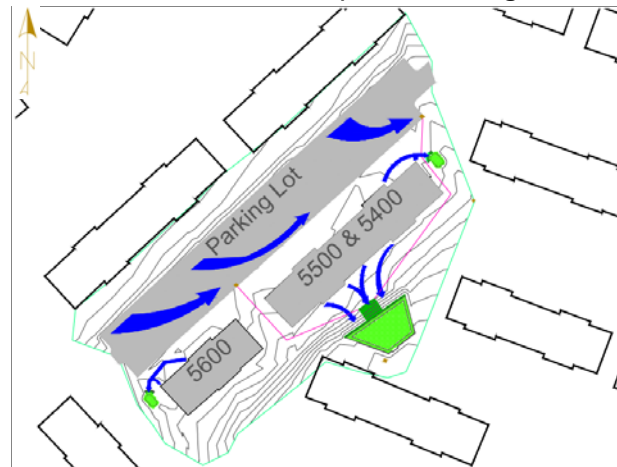
- VaDEQ Stormwater Management Handbook. Chapter 4: Hydrologic Methods. 1999, first edition.
- VaDCR Stormwater Design Specification No.9: Bioretention. 2011.
- VaDEQ Virginia Runoff Reduction Method Worksheet. Ver. 2.7, April 2013.

## Existing Site Conditions



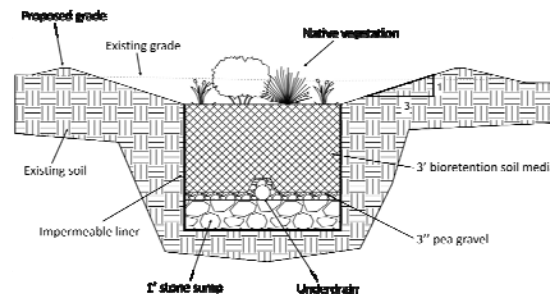
FOX Stormwater team surveyed the existing site at Foxridge Phase V.

## Plan View of Proposed Design

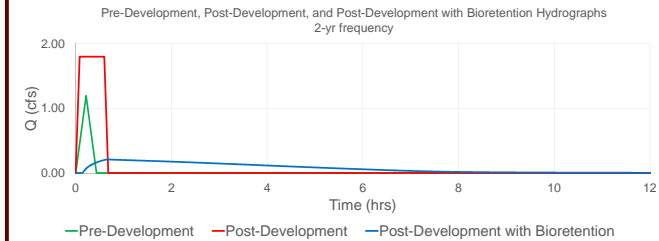


Impervious Area    Bioretention Feature    Grass Filter Strip    Building    Flow Path    Underground Pipe    Rooftop Gutter    1 ft Contours

## Cross-sectional View of Bioretention Filter



## Hydraflow Hydrographs



- Post-development bioretention filters reduce 2-yr peak flow from 1.2 cfs (pre-development) to 0.2 cfs.
- Bioretentions completely contain 2-yr storm event volume.
- Outflow through underdrains controlled by soil infiltration rate.

## Cost Analysis

Component	Component Cost
Bioretention Level II	\$3,503.66
Micro-bioretention #1	\$442.30
Micro-bioretention #2	\$385.16
Geotextile Fabric	\$323.00
Pond Liner	\$2,115.75
Curb Grate	\$1,850.00
Pipe	\$7,783.69
Vegetation	\$3,494.75
Excavation	\$7,652.00
<b>Total</b>	<b>\$27,550.30</b>

Bioretention installation costs covered by VaDEQ grant (\$29,500) to support the Stroubles Creek TMDL Implementation Plan.

## Summary

The proposed stormwater retrofit design successfully contains the 1- and 2-year design storms by routing stormwater through three bioretention filters of varying size. The design exceeds the required phosphorus load reduction of 1.63 lbs/yr by using simple rooftop disconnections, grass filter strips and bioretention filters. The design was driven by on-site space constraints. Project-estimated installation costs are 6% less than those initially budgeted for a grant that will be used to install the bioretention basins. However, annual maintenance costs (\$600) are estimated to exceed annual savings from stormwater utility fee credits (\$359).

## Acknowledgements

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