

Presentation for:

# Landmark/Van Dorn Corridor Stormwater Master Plan

October 20, 2008

Baker



# Presentation Outline

Landmark / Van Dorn Corridor

- **Stormwater overview**
- **City Strategic Planning**
- **Regulatory and environmental drivers**
- **Defining stormwater master planning**
- **Stormwater management vision**
- **Existing site conditions**
- **Redevelopment opportunities**
- **Recommendations**
- **Incorporating stormwater management into the overall master plan**



# The Landmark/Van Dorn Stormwater Challenge is to Determine How to Effectively:

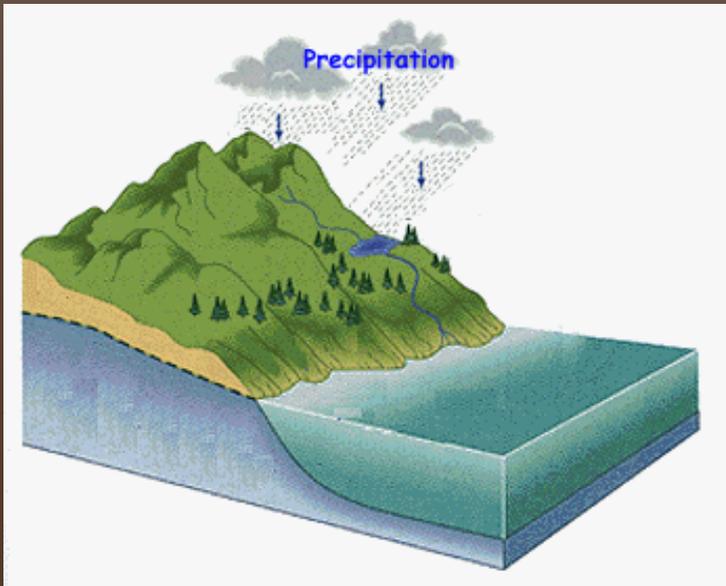
- 1. Provide stormwater management where little exists today**
- 2. Incorporate stormwater management with new practices as well as shared use of new open space**
- 3. Develop a process for selecting practices that are part of a green network**
- 4. Structure a stormwater management program to meet these needs in as fair and equitable a manner as possible**



# What is Stormwater?

## Stormwater:

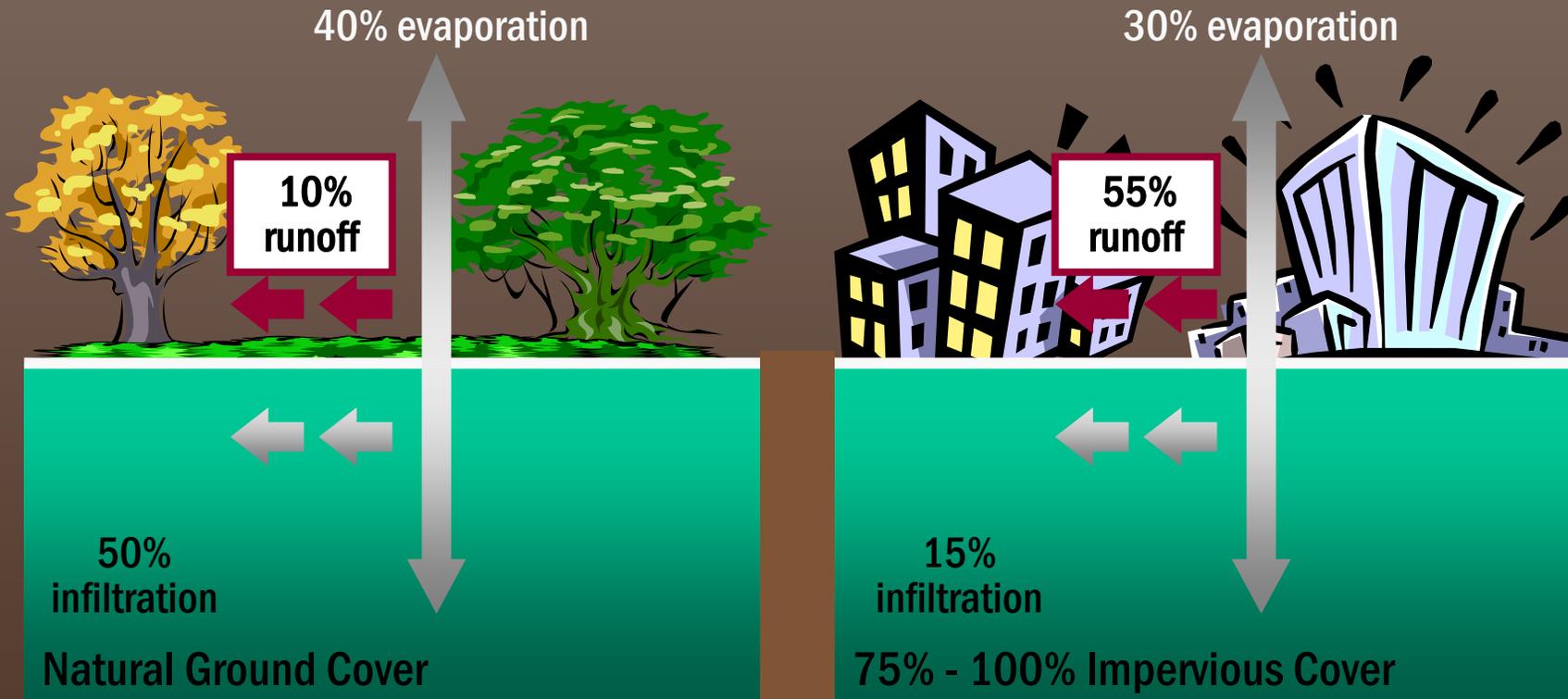
- The flow of water that results from precipitation and which occurs immediately following rainfall or as a result of snowmelt.
- Impervious surfaces like buildings, parking lots, and streets can prevent stormwater from naturally soaking into the ground. Consequently, the water “runs off” into a catch basin, a side ditch, or some other stormwater collection system that transports the water directly to a river or lake.





# Impervious Cover Impacts Stormwater Runoff

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# Impervious Cover in Commercial and Residential Areas

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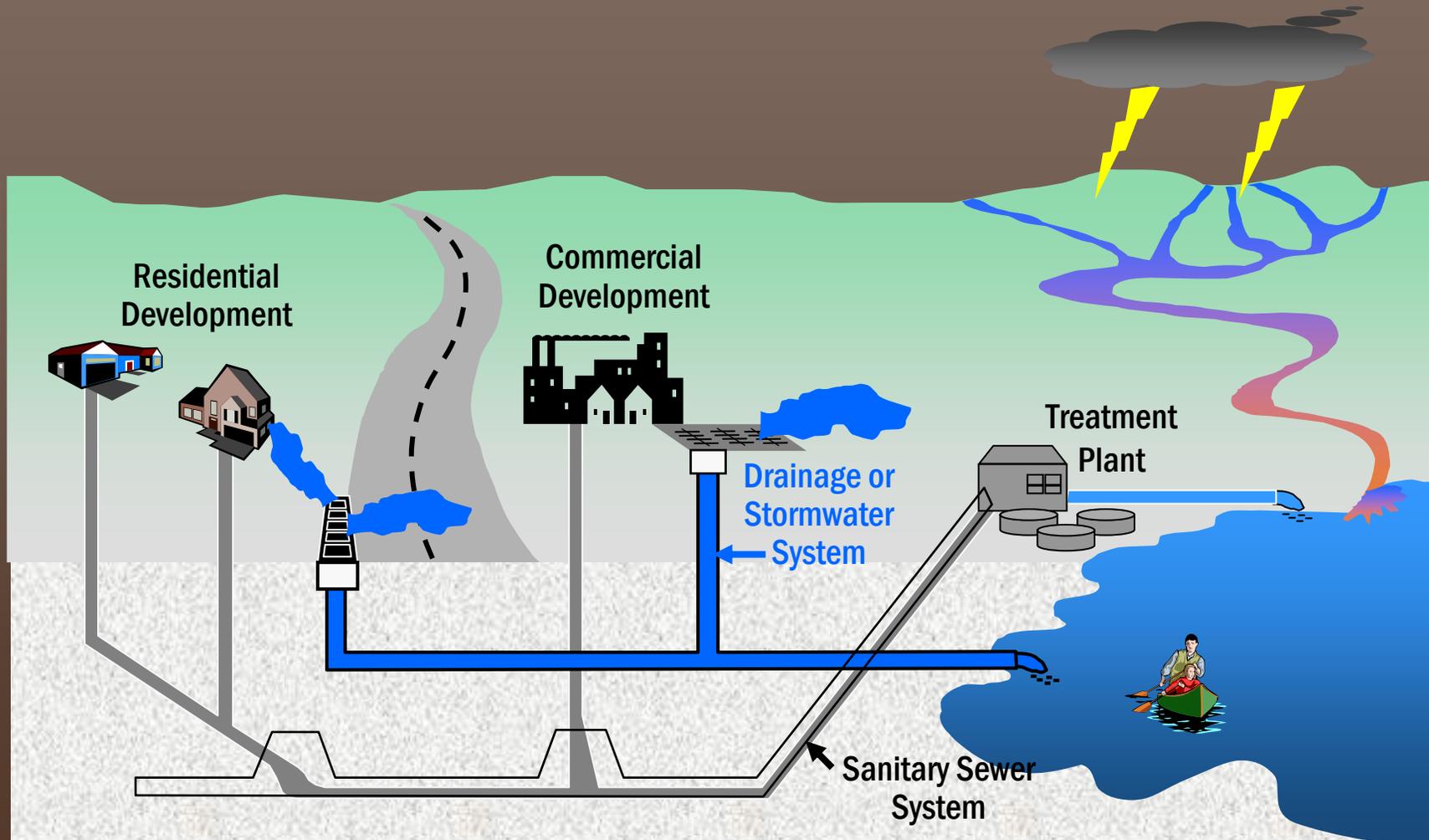
Landmark / Van Dorn's average imperviousness: 70%





# Where Does Stormwater Runoff Go?

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# So What's the Big Deal?



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- As storm water flows over driveways, lawns, and sidewalks, it picks up debris, chemicals, dirt, and other pollutants, and empties into a storm water collection system.



- Anything that enters a storm water collection system is discharged untreated into the lakes and rivers we use for swimming, fishing, and providing drinking water, unless BMPs have been constructed.



# Limited control lets single failures create severe outcomes

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# How Does Management of Stormwater for Quality Control Differ From Quantity Control

- **Quality control uses practices to remove pollutants such as chemical (e.g., phosphorus, gasoline), physical (e.g., sediment, trash) or biological (e.g., fecal coliforms, Enterobacteriaceae )**
- **Quantity controls detain or retain a volume of water to delay or reduce discharges to streams. This reduces stream flooding, erosion, and ecosystem impairment.**
- **Best management practices (BMPs) is the term used to describe a technique to control or manage stormwater quantity and quality.**



# How Do Stormwater Quantity and Quality Controls Work?

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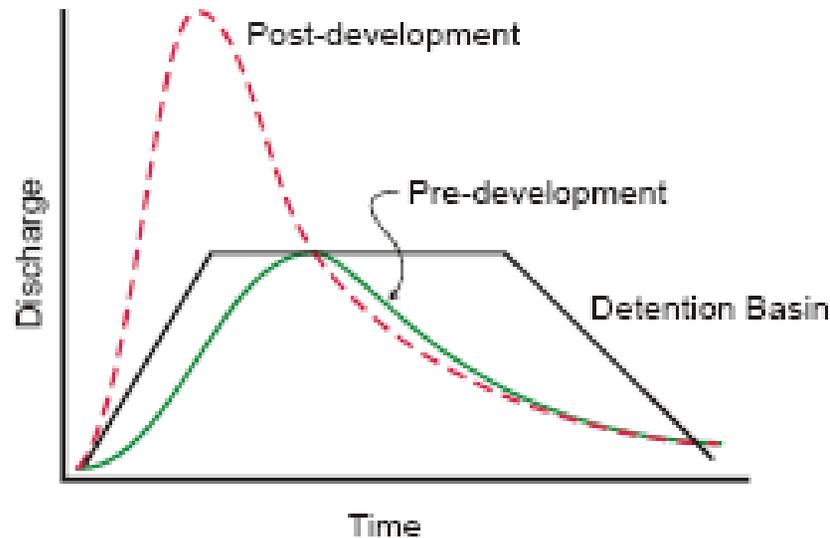


Figure 3.1 - Typical Hydrographs



Figure 4.1 - Enhanced Extended Detention Basin (VADCR, 1999).



# The Quality of Water Leaving a Site Depends on the Treatment Practices Used

Table 4.2 - Median Pollutant Removal (%) of Stormwater Treatment Practices (Center for Watershed Protection, 2000)

	TSS	TP	Sol P	TN	NOx	Cu	Zn
Stormwater Dry Ponds	47	19	- 6.0	25	4.0	26 <sup>1</sup>	26
Stormwater Wet Ponds	80	51	66	33	43	57	66
Stormwater Wetlands	76	49	35	30	67	40	44
Filtering Practices <sup>2</sup>	86	59	3	38	- 14	49	88
Infiltration Practices	95 <sup>1</sup>	70	85 <sup>1</sup>	51	82 <sup>1</sup>	N/A	99 <sup>1</sup>
Water Quality Swales <sup>3</sup>	81	34	38	84 <sup>1</sup>	31	51	71

<sup>1</sup> Fewer than 5 data points

<sup>2</sup> Does not include vertical sand filters and filter strips

<sup>3</sup> Refers to open channel practices designed for water quality

N/A = Data are not available

TSS = Total suspended solids; TP = Total phosphorus; Sol P = Soluble phosphorus;

TN = Total nitrogen; NOx = Nitrate and nitrite; Cu = copper; Zn = Zinc



# Landmark / Van Dorn Drains to Holmes and Backlick Runs

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# The City Continually Needs to Maintain Receiving Streams

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# Comprehensive Overarching City Programs Govern Civil and Environmental Welfare

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# Several Recent City Actions Continue Environmental Enhancement

City of Alexandria Strategic Plan  
2004-2009

Water Quality Management Supplement  
2001

Eco-City Charter  
June, 2008

Draft Environmental Action Plan  
Fall, 2008 (Phase I) June, 2009 (Phase II)

Landmark/Van Dorn Corridor Plan  
2008

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# Eco-City Charter Goals

- Use environmentally responsible flood management, stormwater control, and wastewater treatment to protect the public's health and property.
- Promote, through sustainable practices, safe, swimmable, and fishable waterways for its citizens and visitors, and enhance the ecological integrity of its downstream waters, by minimizing stormwater runoff and pollutants draining to the Potomac River and Chesapeake Bay.



# Landmark/Van Dorn Environmental and Sustainability Goals

Developed through the Landmark Van Dorn Planning Process

**“An area wide, comprehensive approach should be established for environmentally sustainable development, including Leading Energy and Environmental Design (LEED) standards, best practices in local and regional stormwater management, reduced impervious areas, enhanced water quality, and protection and restoration of habitat areas and natural features throughout the study area.”**



# Current City of Alexandria Regulations and Policies

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- **City of Alexandria Strategic Master Plan**
- **Alexandria Open Space Master Plan**
- **City of Alexandria Eco-City Charter**
- **City of Alexandria Landscape Guidelines**
- **City of Alexandria Zoning Ordinance**
- **Article XIII Environmental Management Ordinance**
  - Chesapeake Bay Preservation Ordinance
  - RPA enhancement and protection



# Stormwater Master Plans Identify Problems and Solutions

- Incorporates comprehensive stormwater management at the early planning stages
- Integrates stormwater, open space, road, sewer, and other master planning efforts
- Outcomes can be:
  - Effective long term stormwater management
  - Efficient land use to achieve broad goals
  - Development of community goals and standards



# Current City Stormwater Management Requirements

- **Stormwater quantity**
  - “New” impervious area peak discharge of runoff must not exceed predevelopment peak discharge for the 2-year and 10-year storms
- **Stormwater quality**
  - All development must control water quality
  - The first ½ inch of runoff must be captured
  - Phosphorus loads must be reduced



# Stormwater Regulatory Requirements and Environmental Stewardship Needs

- **State & Federal government requirements:**
  - VPDES stormwater (MS4) program
  - Total Maximum Daily Load program (TMDL)
  - Chesapeake Bay Preservation program
  - National Flood Insurance Program
  - Erosion and Sediment Control program
- **Health and safety requirements**
- **Environmental stewardship**
  - Stream restoration and deterioration
  - Riparian area / wetland protection/restoration
  - Ecosystem habitat restoration
  - Environmental Charter and Environmental Action Plan



# Stormwater Management Vision

The Landmark / Van Dorn Corridor Plan establishes stormwater management policies and strategies that respond to the unique opportunities and challenges of the planning area and employ innovative techniques to improve stormwater quality and quantity

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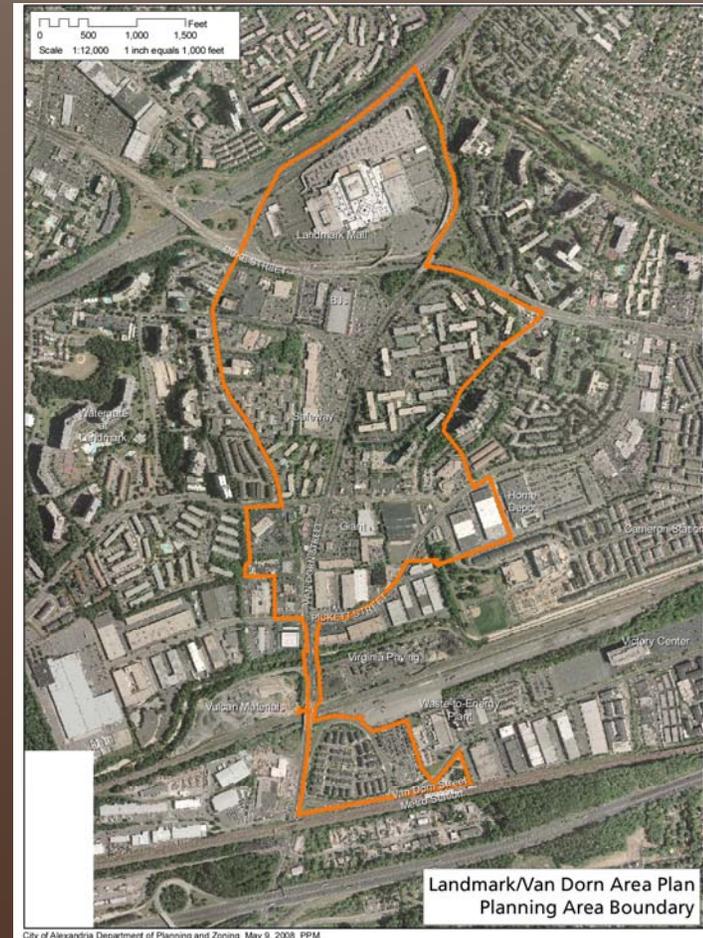




# Existing Site Conditions

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- Existing development predates stormwater management regulations (e.g., negligible SWM now)
- Stormwater conveys quickly from surfaces to storm sewers to streams
- Topography divides the planning area into two watershed drainage areas roughly along Duke Street (a little south)
- Average site imperviousness is 70% while City-wide is 41%





# Existing Site Conditions

- **Landmark Mall**
  - High percent of imperviousness is due in part to large parking lots
  - This impervious area generates tremendous stormwater runoff
  - Solely commercial space
- **Van Dorn**
  - Various urban land uses with variable lot sizes
  - Unplanned developed over many years
- **Roads**
  - Most rights-of-way consumed by impervious surfaces





# How do these existing conditions affect the City?

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- Storm sewer maintenance
- Storm sewer capacity
- Stream deterioration
- Water quality (e.g., fecal coliforms, TMDL)
- Green space that does not provide stormwater benefits
- Perpetuates the concept of stormwater as a liability rather than a resource



Holmes Run



Backlick Run



# Reasons for Enhanced Stormwater Management Goals:

- Redevelopment will not trigger current stormwater quantity regulations if impervious surfaces are not increased
- Over 75% of all storm events could reasonably be captured to reduce flooding and erosion and to reduce pollutants
- Opportunity to improve health of adjacent open spaces
- Support City's ongoing efforts to restore Backlick, Holmes and Cameron Runs
- Reduce flooding through and along these streams
- Support City initiatives (e.g.; Eco-City, Low Impact Development Design Supplement, etc.)
- Improve the health of the Potomac River and the Chesapeake Bay



# Recommendations of Strategies

- **Minimize impervious area**
- **Provide on-site stormwater controls**
- **Seek regional stormwater controls to manage off-site as well as on-site stormwater**
- **Maximize directing stormwater to landscaped areas**
- **Promote rainwater capture and reuse**
- **Increase public awareness by highlighting stormwater management as an attractive form in the urban environment**



# Recommended Stormwater Goal and Water Quality Standards

- **Goal: Protect Alexandria's streams from erosion and degradation caused by the most frequent storms**
- **Quality control standards**
  - Capture and treat first ½ inch of runoff
  - Remove 40% of phosphorus load



# Recommended Stormwater Quantity Standards. For the 1-year, 24-hour storm:

- Reduce post development runoff to either:
  - Match average City conditions (41% imperviousness); or
  - Provide detention for 50% of difference between post development and average City conditions
- Runoff hydrograph shall minimize stream erosion
- Peak discharge shall not exceed the existing peak discharge
- Credit provided for open space, cisterns for water reuse, green roofs, and other LID practices



# SWM Planning Opportunities

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- **Provide stormwater management**
  - Adding management provides local and downstream benefits
  - Planning multiple use of spaces yields SWM and green landscape
  - Desire SWM goal with flexible design options
- **Landmark Mall**
  - Entire site may redeveloped at one time
  - One comprehensive central plan concept
- **Van Dorn, Pickett and Other Properties**
  - Redevelopment in phases (decades)
- **Streets**
  - ROWs
  - New street



# Integrate Stormwater Management with other planning efforts

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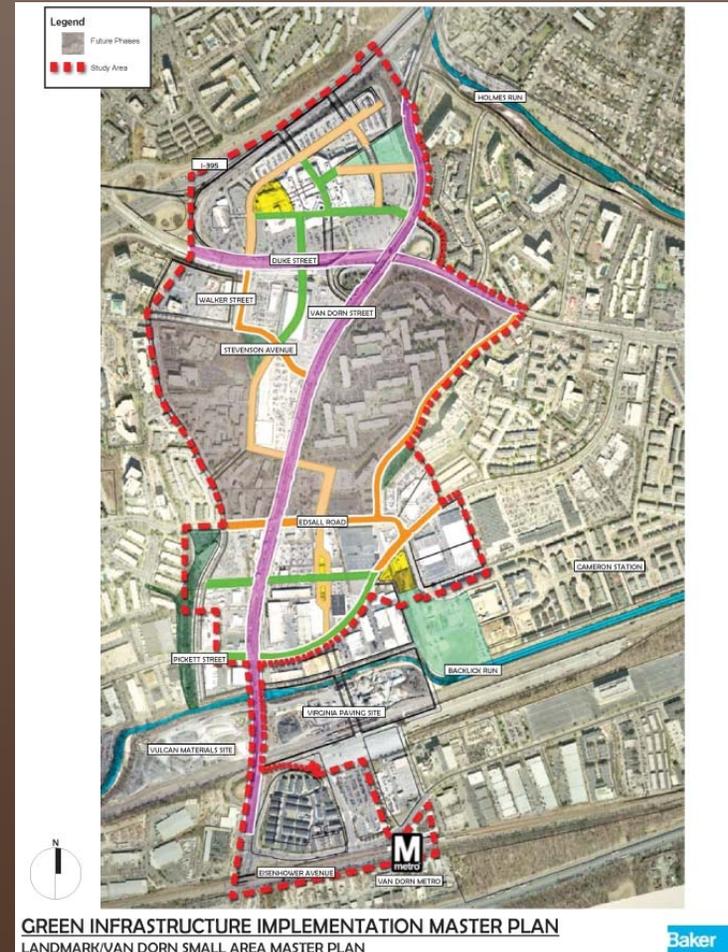
## Linear Corridors



## Nodes



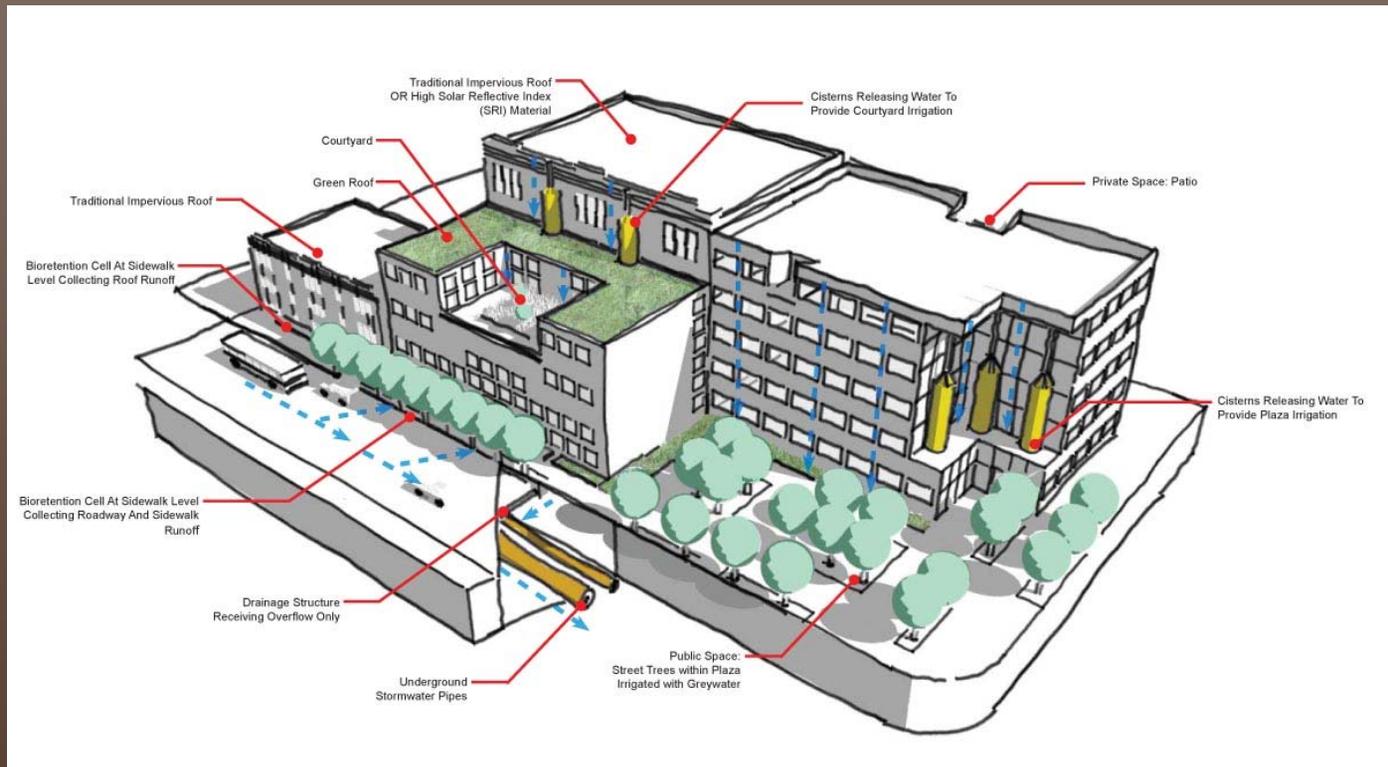
Capitalize on newly defined open spaces and land uses





# Public/Private efforts to control stormwater

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- Integrate BMPs into site design AND architecture design
- Harvest stormwater for reuse



# Recommendations of BMP Selection and Implementation

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## *CATEGORY A – TECHNIQUES APPROPRIATE FOR THE ENTIRE STUDY AREA*

- **Shade Tree Planting**
  - Street Tree Continuous Root Zone
  - Aeration Strip Under Sidewalk
- **Soil Amendments**
- **Bioswales, Bioslopes, Bioretention Cell**
  - Conservation Landscaping
  - Vegetated Filter Strip
- **Cisterns - Greywater Reuse**
- **Green Roof**





# Integrating BMP into site and architecture design

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**Bridge over bioretention cell to access building from plaza**



**Create multi-functional landscapes**



**Integrate landscaped bioretention cells into the sidewalk**



**Celebrate stormwater by designing bioretention cells in front of building entrances**





# Recommendations of BMP Selection and Implementation

Landmark / Van Dorn Corridor

## ***CATEGORY B - HIGHLY RECOMMENDED FOR OPEN SPACE/GREEN SPACE AREAS***

- Conservation
- Reforestation



## ***CATEGORY C - APPROPRIATE FOR SPECIFIC AREAS BASED ON SITE CONSTRAINTS***

- Stormwater Management Pond (integrated with open space)
- Porous Pavers
- Permeable Pavements
- Pocket Wetlands
- Stream Daylighting





# Integrating BMP into site design

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**Daylight streams and create bodies of water for passive recreation**



**Create multi-functional landscapes**



**Providing a path system through the natural landscape**



**Integrate path system with stormwater management – weirs and check dams**



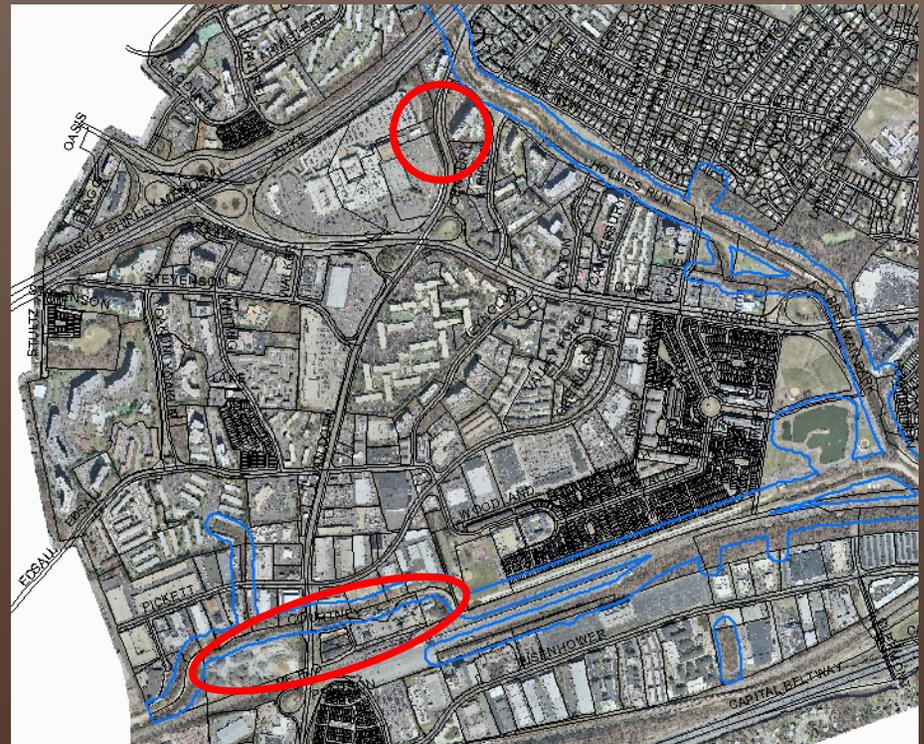
# Regional Quantity Controls

Using stormwater management ponds for both aesthetic benefits and stormwater benefits

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Examples of nearby ponds



Possible locations for ponds in the Landmark / Van Dorn area



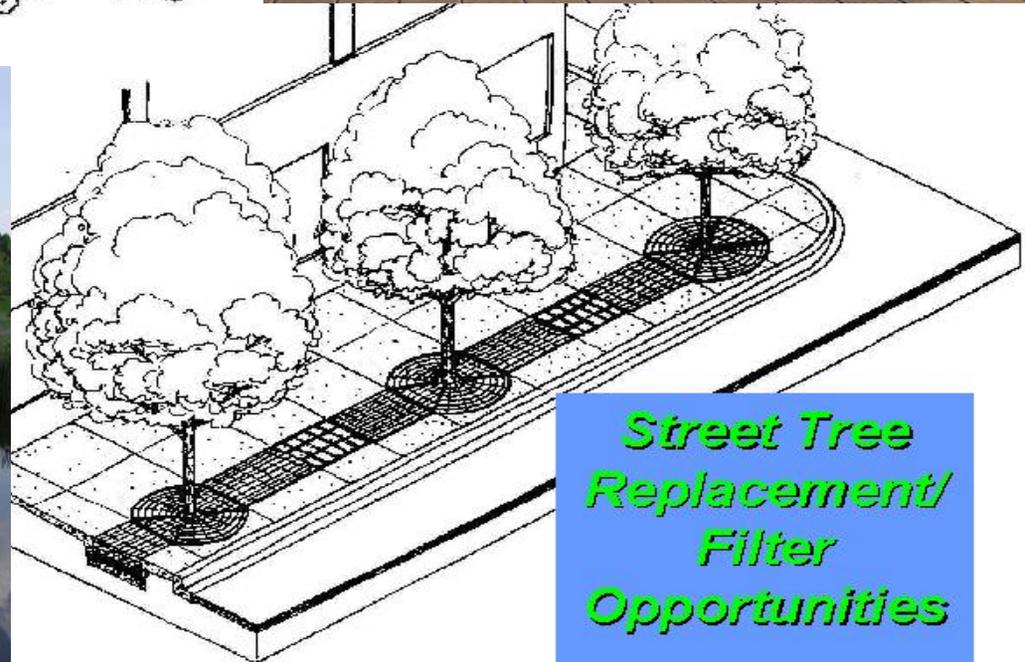
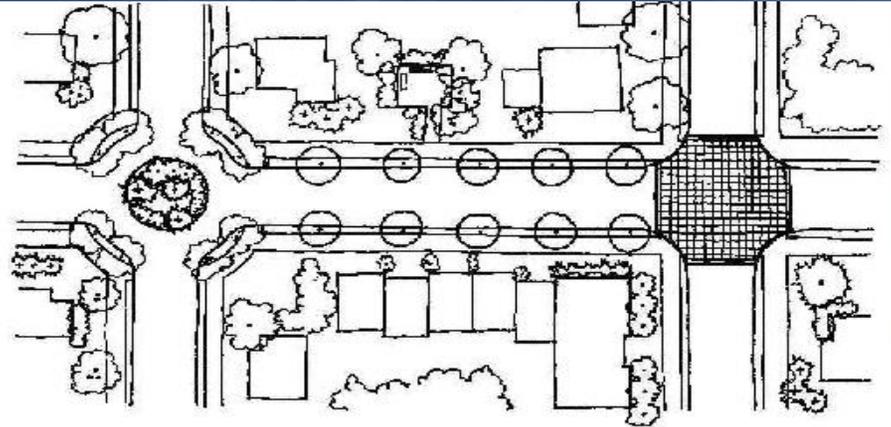
# Impacts to Future Development

- Help create healthy streams in an urban environment
- Promote awareness and appreciation for the natural environment
- Link urban areas to receiving bodies of water through a green network of BMPs
- View stormwater management as part of a comprehensive planning and design effort
- Improve water quality and quantity through aesthetic stormwater management facilities
- Capitalize on stormwater as an asset



# Questions & Answers

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# Web Links

- **Eco-city**
  - <http://alexandriava.gov/tes/info/default.aspx?id=12532>
- **City Office of Environmental Quality including the Water Quality Management Supplement**
  - <http://alexandriava.gov/tes/oeg/info/default.aspx?id=3844>
- **US Environmental Protection Agency Non-Point Source Runoff web page**
  - <http://www.epa.gov/nps/urban.html>
- **Virginia Department of Conservation and Resources**
  - [http://www.virginiadot.org/vtrc/main/online\\_reports/pdf/05-cr5.pdf](http://www.virginiadot.org/vtrc/main/online_reports/pdf/05-cr5.pdf)



# Current State of Virginia Regulations and Legislation

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REGULATION AND LEGISLATIVE CITATION(S)	ADMINISTRATIVE ORGANIZATION(S)
Virginia Dam Safety Regulations 4 VAC 50 - 20 - 10, et. seq.	Virginia DCR
Virginia Erosion and Sediment Control Law (ESC) Code of Virginia 10.1 - 561; 21 - 89.1 4 VAC 50 - 30	Virginia DCR
Virginia Pollutant Discharge Elimination System (VPDES) 40 CFR Parts 122, 123, 124, 403, and 503 Code of Virginia 62.1 - 44.15 9 VAC 25 - 31	Virginia DCR
Virginia Stormwater Management Law (SWM) 4 VAC 50 - 60	Virginia DCR



# Current State of Virginia Governing Regulations and Legislation

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REGULATION AND LEGISLATIVE CITATION(S)	ADMINISTRATIVE ORGANIZATION(S)
Clean Water Act - Section 404  33 CFR Parts 320 - 330	U.S. Army Corps of Engineers U.S. Environmental Protection Agency
National Flood Insurance Program  44 CFR Parts 59 - 77	Federal Emergency Management Agency
Virginia Chesapeake Bay Preservation Act  9 VAC 10 - 20	Virginia Department of Conservation and



# Current State of Virginia Governing Documents or Regulations

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REGULATION AND LEGISLATIVE CITATION(S)	ADMINISTRATIVE ORGANIZATION(S)
Virginia Water Protection Permit (VWPP)  Code of Virginia 62.1 - 44.15(10) and  62.1 - 44.15:5  9 VAC 25 - 210	Virginia Department of Environmental Quality
Code of Virginia 12 - 13.5	Local Wetland Boards