Changes to Stormwater Regulations and Pond Opportunity on Eisenhower East Block 19

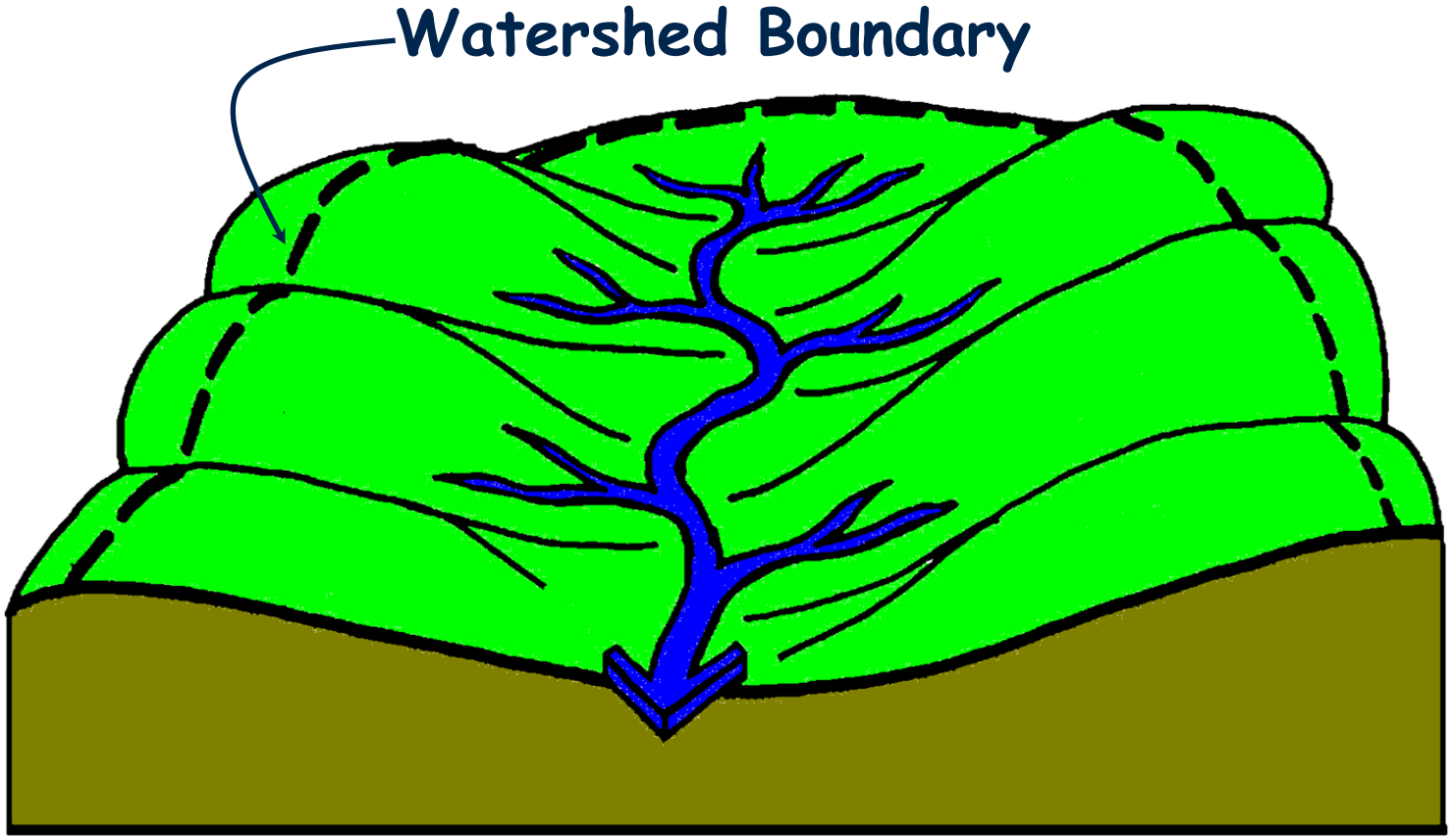
Joint meeting between
Environmental Policy Commission
Park and Recreation Commission
April 2, 2013

Stormwater: Issues & Challenges

- Stormwater Primer
- Regulatory Background and Existing Program
- New Stormwater Regulatory Changes
- Possible Alternatives to meet Chesapeake Bay Total Maximum Daily Load (TMDL) Reductions
- Current Process to Evaluate Impacts and Costs

What is a Watershed?

Area of land that drains to a stream, marsh, or other body of water.

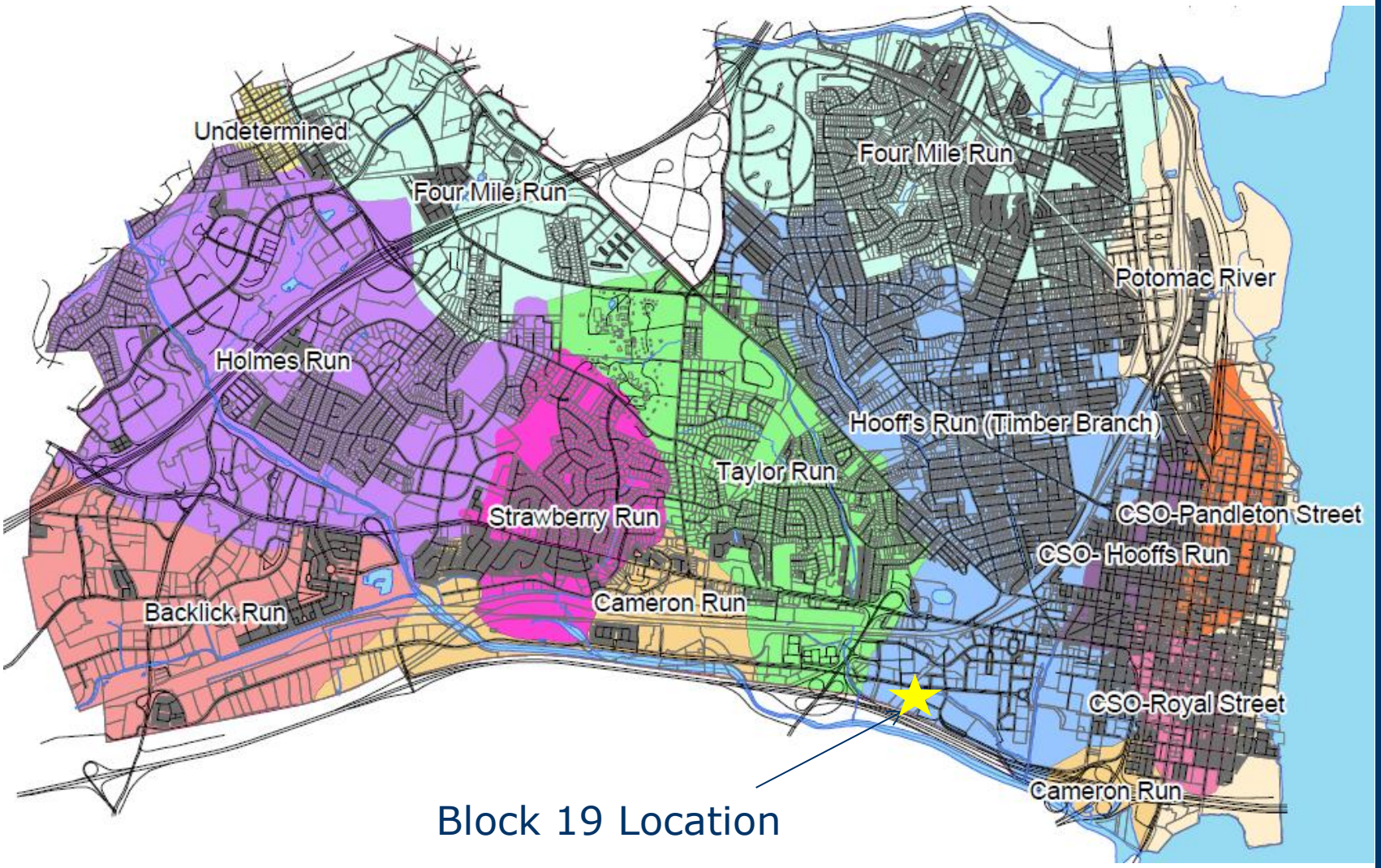


Chesapeake Bay Watershed

- 64,000 sq. miles
- Six states and DC
- 15 million people
- 3,600 species of plants and animals
- Shallow, productive estuary

CHESAPEAKE BAY
A Satellite View

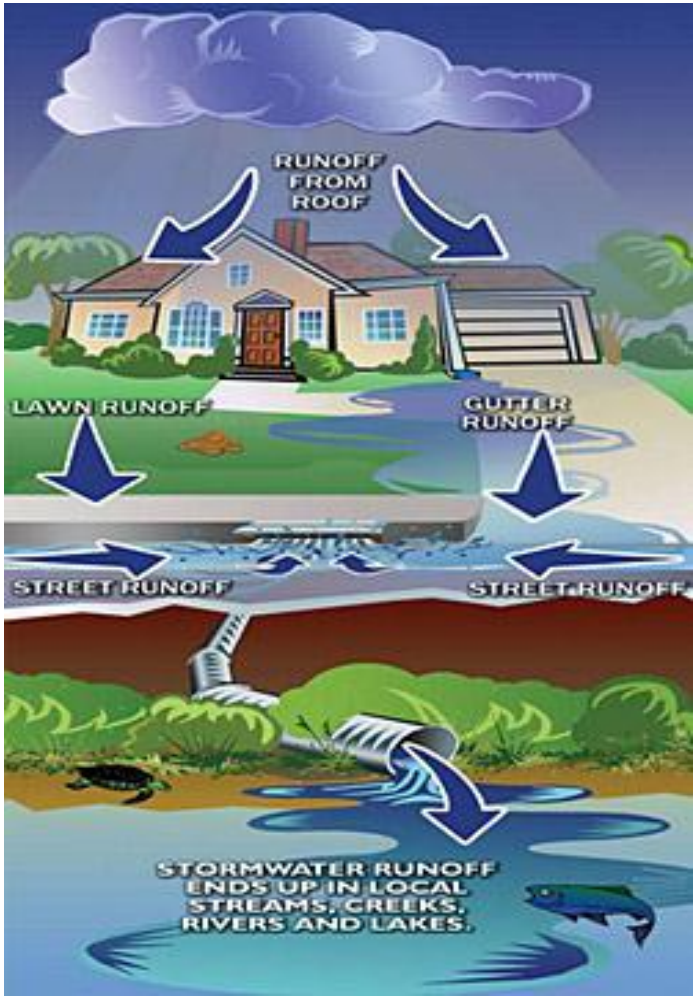
Alexandria Watersheds



Block 19 Location

Stormwater Runoff & Conveyance

- Inlets and storm sewer pipe infrastructure



Regulatory Background

- 1972 – Clean Water Act
- 1988 – Chesapeake Bay Preservation Act
- 1992 – Local ChesBay Ordinance required stormwater quality BMPs
- 2003 – First MS4 Permit
- 2006 – Environmental Management Ordinance updates
- 2010 – Chesapeake Bay TMDL
- 2011 – State Stormwater Regulations
  - Implement July 1, 2014

Framework of City Environmental Ordinance

- Entire City is designated as Chesapeake Bay Preservation Area
- Divided into Resource Protection Areas (RPAs) and Resource Management Areas (RMAs)

RPAs

- 100’ natural buffer on perennial streams
- Functions to protect water quality
- Permitted Uses Include:
  - Passive recreation
  - Boardwalk, trails, repair of existing flood control, regional stormwater management facilities, utilities and public roads
  - Stormwater management facilities that drain or treat multiple projects
  - Redevelopment, but with
    - No increase of impervious surface
    - No further encroachment

RMAs

- Covers all areas not designated as a RPA
- Existing ordinance requires stormwater quality BMP's for development and redevelopment projects
- Existing ordinance is more stringent than State requirements;
  - Protects natural intermittent streams
  - Requires water quality volume to be treated (first ½ inch)

BMP's Installed to Date

- Approximately 400 BMPs constructed treating approximately 1200 ac. (65% impervious)

Bioretention (Alexandria Toyota, 3750 Jefferson Davis Hwy.)

TD Bank (557 S. Van Dorn St.)

Green Roof / Rain Barrel(Alexandria City Hall)

Flexi-Pave Permeable Pavement (Taft Ave.)

StormFilter (Lindsay Lexus, 1525 Kenwood Ave.)

D.C. Sand Filter (Fairchild Property, 1001 Bernard St.)

New Stormwater Regulatory Changes

- New State Stormwater Management Regulations
- Chesapeake Bay Total Maximum Daily Load (TMDL)
- Municipal Separate Storm Sewer System (MS4) Permit

New Stormwater Management Regulations

- Delegates authority for regulatory Local Stormwater Program

- Water Quality Criteria
  - Capture 1” vs. previous 0.5”
  - New: 0.41 lbs./ac/yr.
  - Redevelopment: 10% or 20% (>1 ac.)

- Water Quantity Criteria

New Stormwater Regulations: Impact on Development

- Bigger, more expensive BMPs
- Retain more stormwater onsite
- Use of Low Impact Development (LID) techniques
  - green roofs, infiltration, cisterns, permeable surfaces, reuse
- Possible fee increase

Chesapeake Bay Total Maximum Daily Load (TMDL)

- TMDL = maximum amount of a pollutant that a waterbody can receive and still meet water quality standards
  - Pollution 'budget' or 'diet'
- Based on modeling and monitoring
- Assigns wasteload allocations (WLAs) for watersheds and localities

Chesapeake Bay TMDL

- EPA developed for Six States and DC in December 2010
- Reductions and budgets for Nitrogen, Phosphorus, and Sediment
- State Watershed Implementation Plan (WIP)
- State will use MS4 Permit to enforce target reductions

MS4 Phased Reductions

MS4 Regulates separate storm sewer discharges to surface waters

Three 5-year MS4 permits to meet Chesapeake Bay TMDL reductions:

<u>Phase I</u>

- 5% by end of next permit (2013 – 2018)

<u>Phase II</u>

- 40% by end of 2nd permit (2018 – 2023)

<u>Phase III</u>

- 100% by end of 3rd permit (2023 – 2028)

MS4 Phased Reductions: Pounds

	N (lbs.)	P (lbs.)	S (lbs.)
Phase I: First MS4 Cycle Target (5%)	380	50	43,097
Phase II: Second MS4 Cycle Target (35%)	2,659	352	301,678
SUBTOTAL PHASE I AND II (40%)	3,039	402	344,775
Phase III: Third MS4 Cycle Target (60%)	4,558	603	517,162
TOTAL REDUCTION (100%)	**7,597**	**1,005**	**861,937**

MS4 Phased Reductions: Acres

Required Reductions	Acres Requiring Treatment
Phase I: 2013-2018 (5%)	120 - 300
Phase II: 2018-2023 (40%)	≈950±(?)
Phase III: 2023-2028 (100% - Total to Comply)	≈2400±(?)

Possible Alternatives to meet Chesapeake Bay TMDL Reductions

- Development & Redevelopment Post 2009
- Regional Stormwater Management Retrofits and New Facilities
- Retrofits on City Property
- Retrofits of City Rights-of-Way
- Offsets

Development and Redevelopment Post 2009

- Developers are required to install best management practice (BMP) facilities to meet stormwater regulations

Regional Stormwater Management Retrofits and New Facilities

- Retrofit of existing regional wet ponds
- Retrofit regional "fishing pond"
- Aesthetics consideration
- Consider current and planned uses

Retrofits on City Property

- Advanced ultraurban BMPs
- High removal efficiencies
- Serves small drainage areas
- Untreated City properties within the MS4 area
- Not all appropriate
- High unit cost

Retrofits on City Property

- Preliminary analysis indicated that even if all City facilities were retrofitted with BMPs the City would fall 600 acres short of 2028 target

Retrofits of City Rights-of-Way

- Bioretention practices between road and sidewalk
- Public streets to consider
  - Route 1 along Potomac Yard
  - Mount Vernon Avenue
  - Route 7 bordering Arlington
  - Van Dorn Street
- City Design Guidelines near completion

Courtesy: City of Richmond

Costs of Possible Alternatives

Reduction Strategy	Unit Cost Per Impervious Acre	Acres	Total Goal Acreage	Strategy Total Cost
Projected Urban Redevelopment	Developer Pays	676	28.10%	Developer Pays
Pond Retrofits and New Ponds	$ 15,000 *	749	31.10%	$ 7.8M
Retrofits on City Property	$164,000	87	3.60%	$ 14.2M
Retrofits of City Rights-of-Way	$113,000	34	1.40%	$ 4.2M
"Gap" Bioretention / Filtration	($87,000 - 164,000)	660	28.00%	$ 108.2M
			Total	**$ 134.5M**

**Approx. median between two higher unit costs*

Process to Develop City-wide Strategy

- Stormwater Steering Committee
  - Key Department Heads and CMO
  - Sets priorities and direction
  - Provides guidance
  - Reviews

- Stormwater Work Group
  - Impacted City Departments
  - Develops alternatives and strategies
  - Immediate: FY2014-15 Work Program
  - Ordinance revisions and procedures

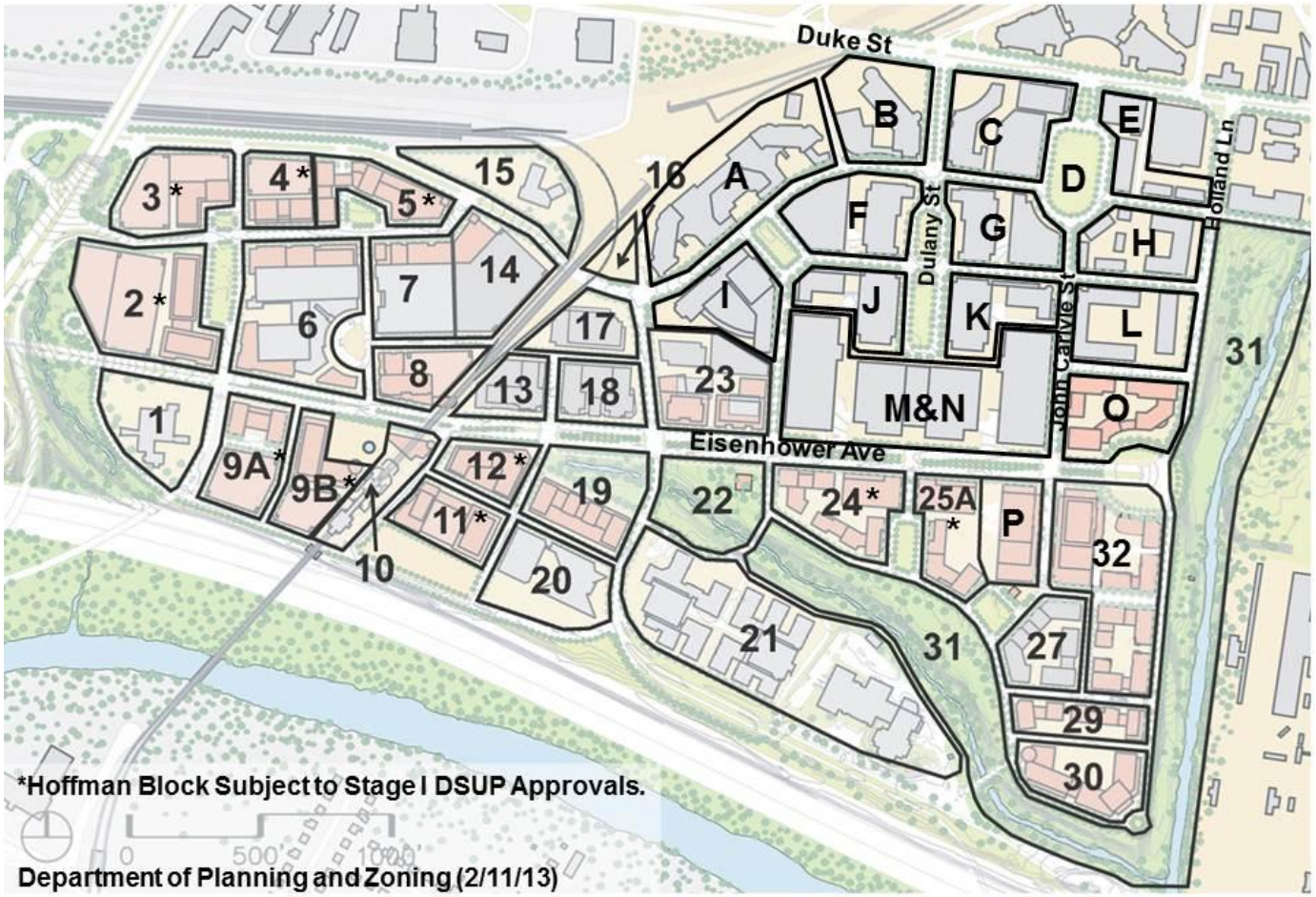
Process to Evaluate Impacts of Alternatives and Costs

- FY2014-15 Stormwater Work Program
  - Chesapeake Bay TMDL Compliance
    - Focus on first permit cycle of 5%
  - Internal and External Stakeholders
    - Including commissions and public input
  - Final ordinance revisions
  - Identify Long-Term Alternatives and Options

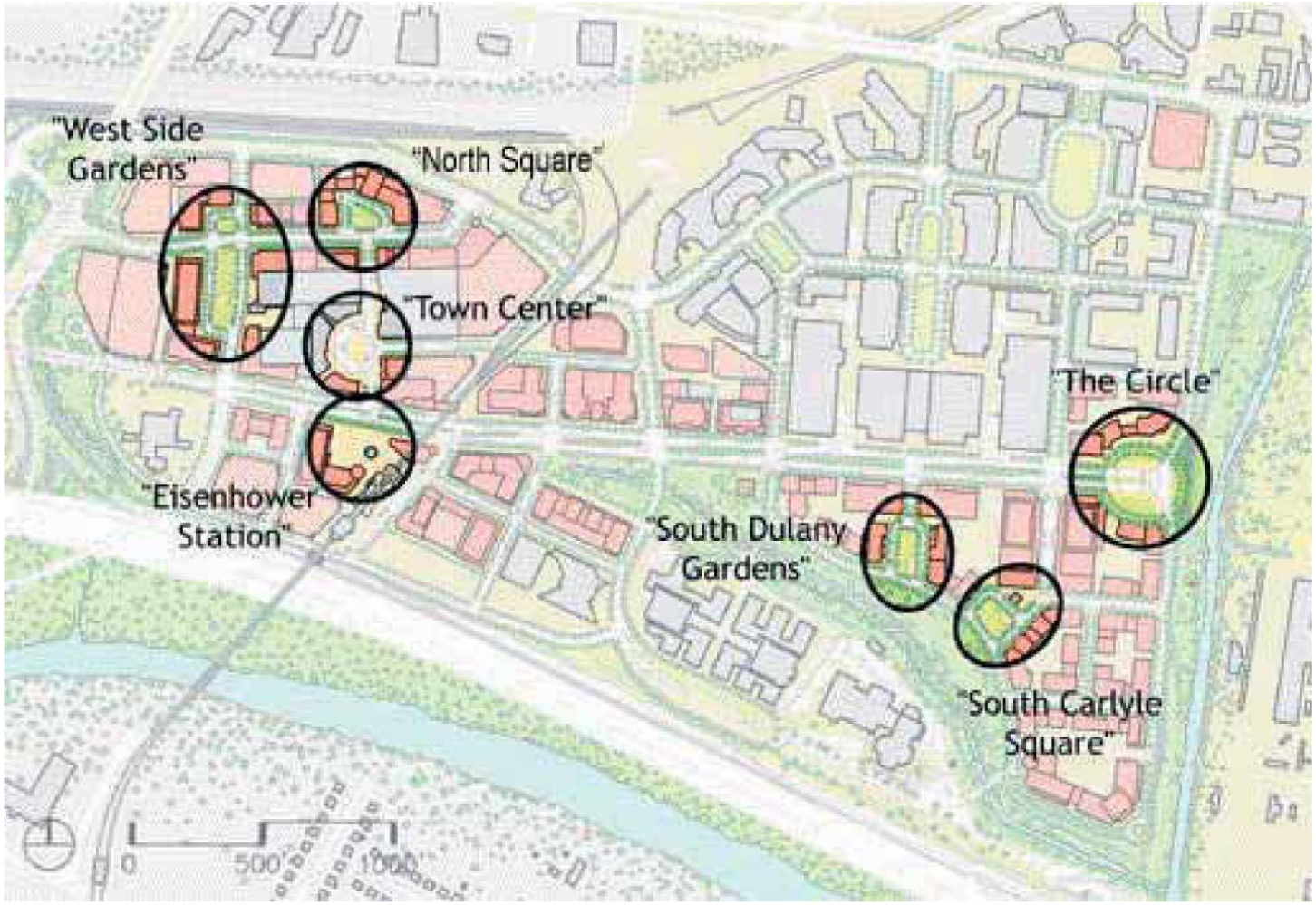
Questions and Comments

Eisenhower East Small Area Plan

Eisenhower East / Carlyle Blocks



Parks and Open Space of Eisenhower East



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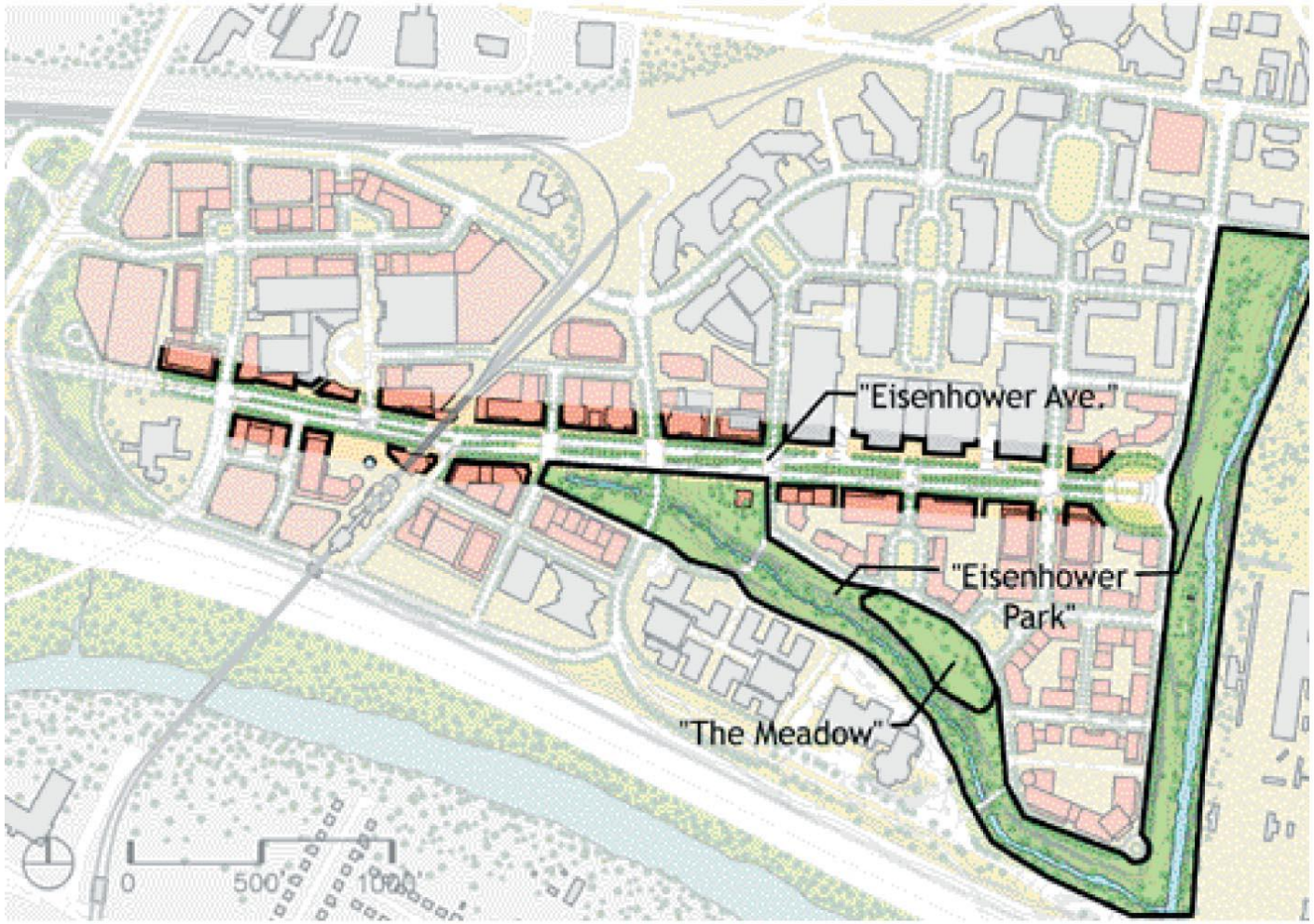
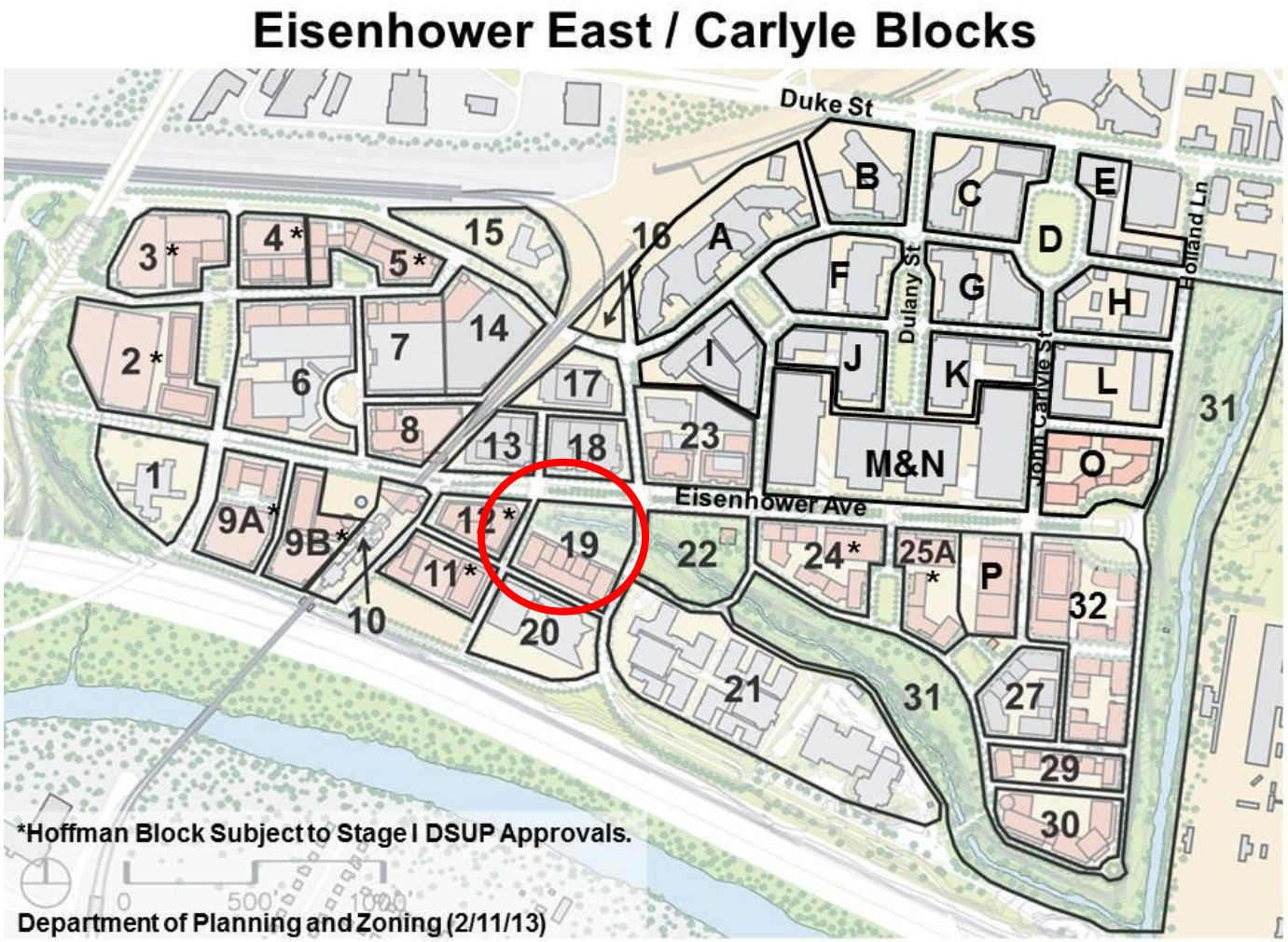


Parks and Open Space of Eisenhower East

- "A comprehensive system of integrated conservation areas and passive and active parks and urban square to meet the needs of the residents and visitors to the area."
- Restoration of the RPA lands is key to Eisenhower Park and the open space program
- The park offers large expanses of open space for formal and informal recreational activities
- The park includes community amenities such as nature trails, bike trails and recreational fitness trails

Block 19: Background



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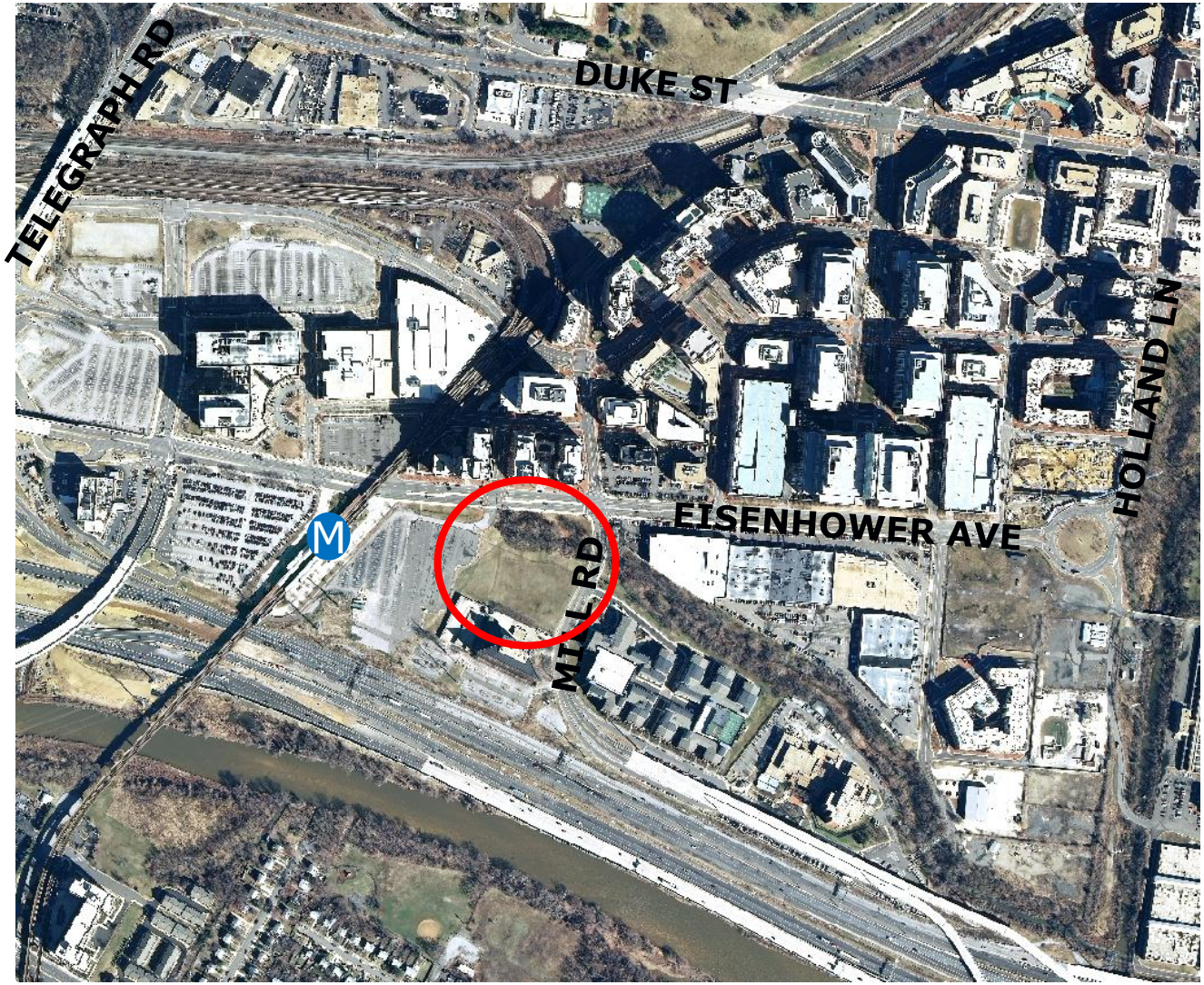

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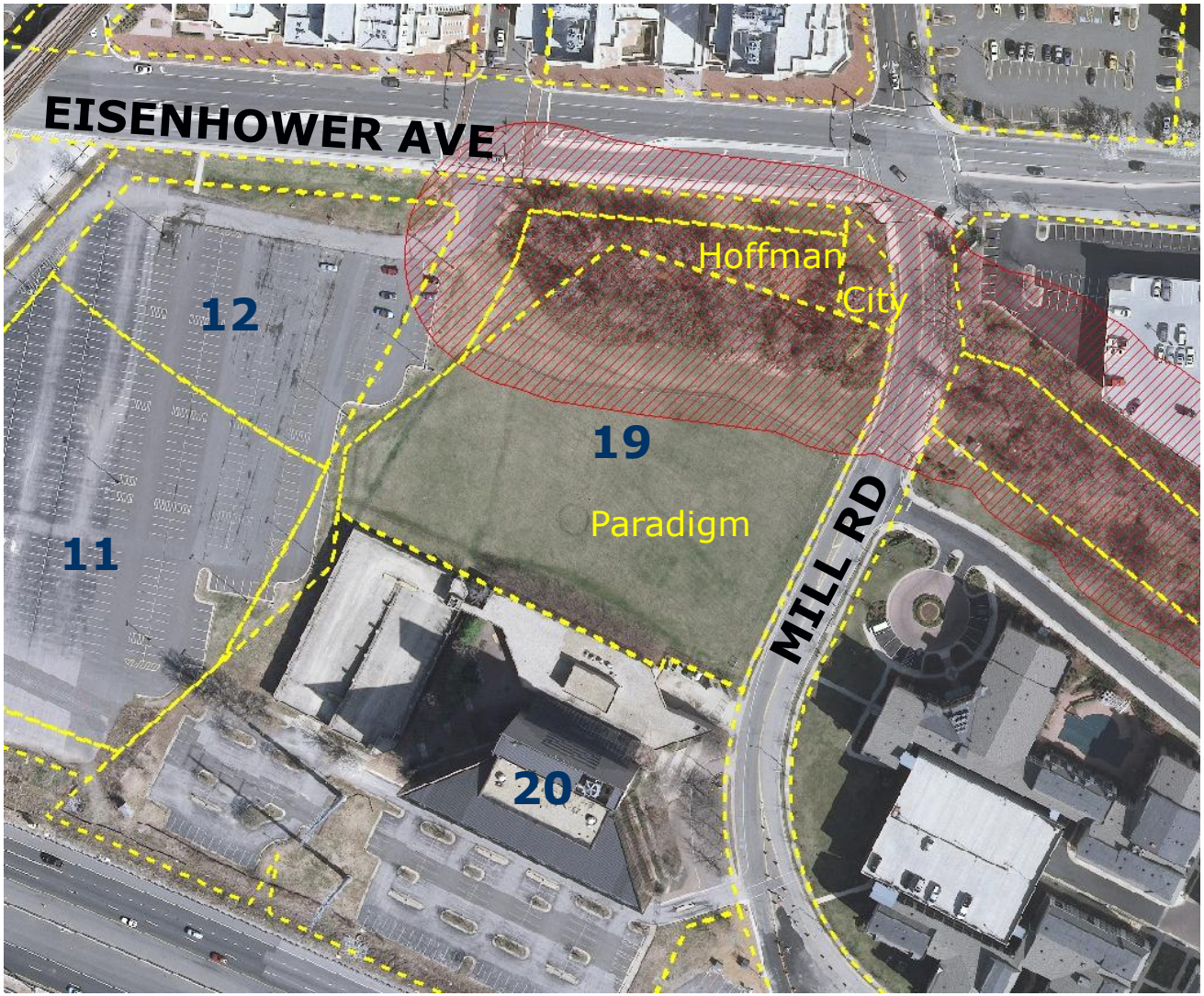

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Block 19: Current Proposal

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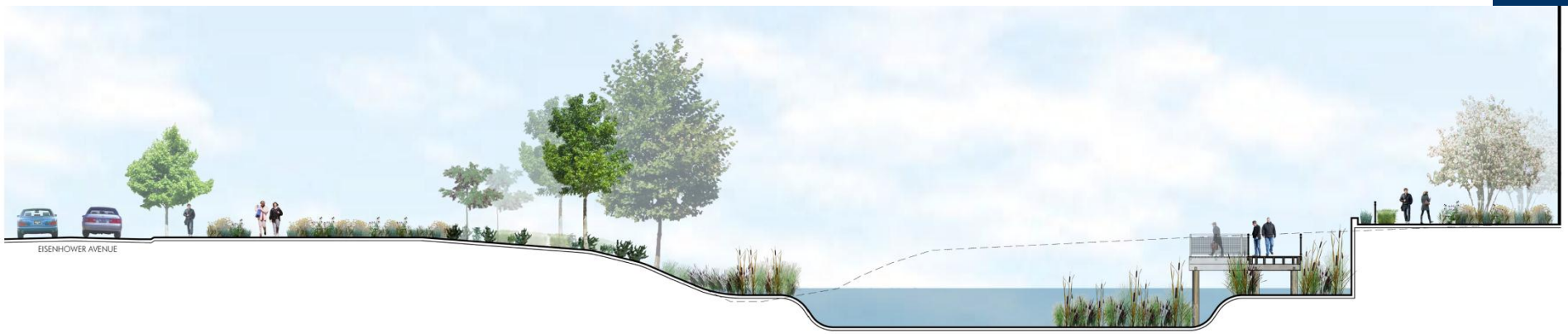
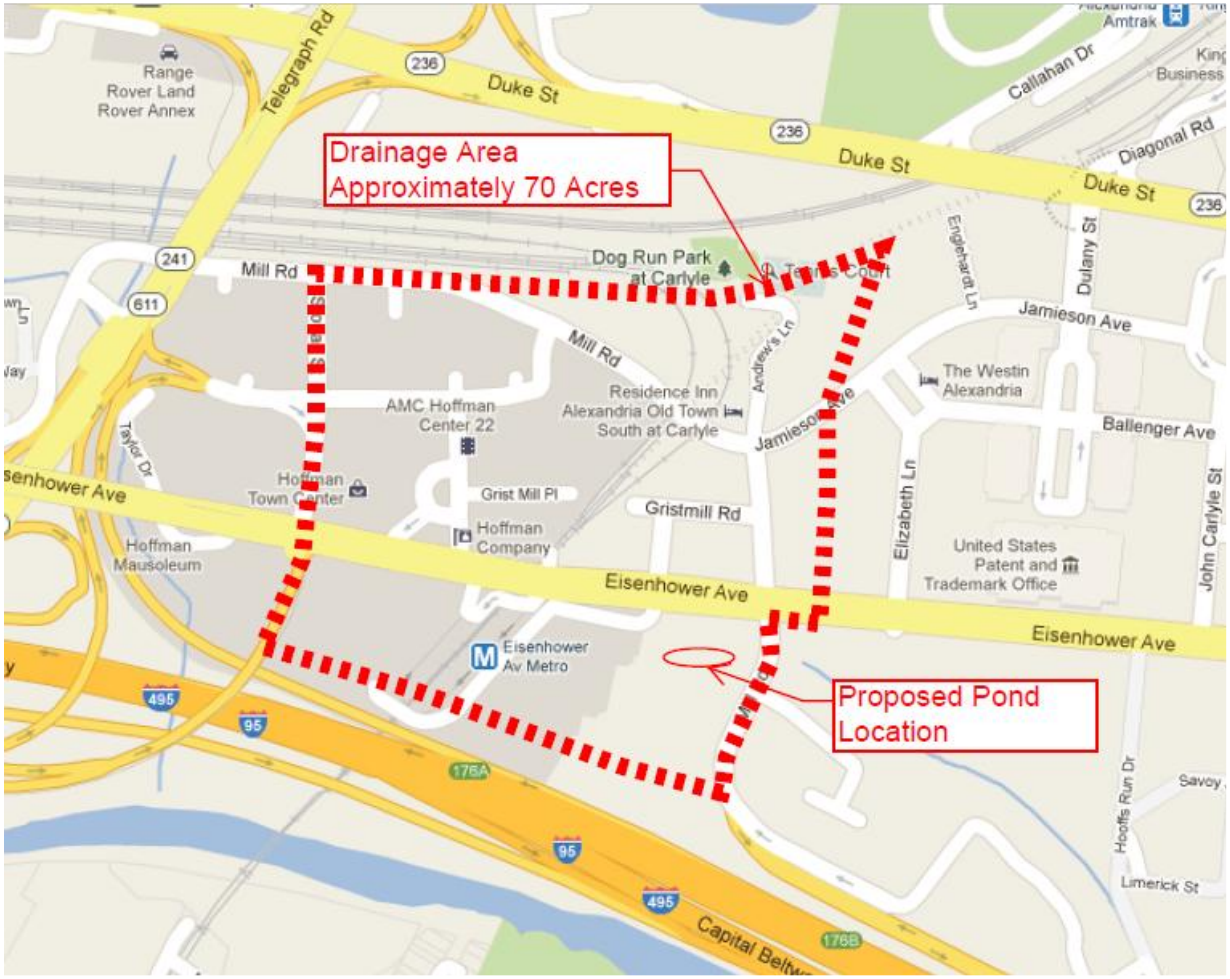


Drainage Area



Regulatory Discussion

- VA Chesapeake Bay Act regulations specifically allow flood control or regional stormwater management facilities within the RPA

- City's Environmental Management Ordinance allows public flood and regional stormwater management facilities in the RPA

- An RPA is not required around the Pond because it is bound by culverts at both ends (no inflow from a perennial stream and no outflow to a perennial stream)

Comparison of Wet Ponds vs. Other Stormwater BMPs

Table 1: Existing City-Owned Non-Wet Pond BMPs

BMP Type	# Facilities	Treatment Area	Impervious Area Treated
Bioretention / Rain Garden	13	10.1	6.0
Filtration System (i.e. StormFilter™ Vault)	7	5.8	4.6
Flow Thru Planter Box	4	1.1	1.1
Grass Swale	1	0.4	0.3
Green Roof	3	0.5	0.5
Hydrodynamic Separator (i.e. Stormceptor®)	10	20.1	16.7
Sand Filter	4	4.7	3.9
Tree Box Filter (i.e. Filterra®)	10	3.8	3.5
Vegetated Filter Strip / Vegetated Buffer	4	1.7	0.4
Dry Pond	1	6.5	5.2
Total	**57**	**54.6**	**42.2**

Comparison of Wet Ponds vs. Other Stormwater BMPs

Table 2: Summary of Existing City-Owned Non-Wet Pond BMPs

BMP Type	# Facilities	Treatment Area	Impervious Area Treated
Total	57	54.6	42.2

Table 3: Existing City-Owned Wet Pond BMPs

BMP Type	# Facilities	Treatment Area	Impervious Area Treated
Regional Wet Pond	3	333.8	208.0

Table 4: Proposed Paradigm Pond-19

BMP Type	# Facilities	Treatment Area	Impervious Area Treated
Regional Wet Pond	1	≈70	≈56

Cost Comparison of Strategies: Pond vs. Alternatives

Strategy	Impervious Acres Treated	Unit Cost per Impervious Acre	Operation & Maintenance (O&M) Cost[1]	Total Cost (Capital + O&M)
Paradigm Pond (Costs borne by developer)	70 (49 effective)[2]	$ 21,000	$ 600,000	**$ 1.5 – 2.1M**
Cost Comparison of Alternatives for Similar Treatment: (Costs borne by City)				
Urban Bioretention / Filtration Retrofits	49	$ 164,000	$ 1,600,000[3]	**$ 9.6M[4]**
New City- Constructed & Maintained Wet Pond	49	$ 24,000	$ 600,000	**$ 1.8M[4]**

1. Calculated over 20 years for both routine and major maintenance
2. About 70 ac. at 35% efficiency = 49 ac. at 50% (effective treatment)
3. Assumes 49 one-acre Urban Bioretention / Filtration Retrofits
4. Cost does not include land acquisition costs or site access costs ($38/sq. ft. or $1.7M per acre)

Pond Option is Consistent with:

- City Strategic Plan
  - Enhance the ecological integrity of waterways by maintaining and improving storm water and sanitary infrastructure and stream system health to minimize environmental impacts
- Water Quality Supplement to the City's Master Plan
  - Targets of Opportunity – regional stormwater ponds for offsite water, particularly with Private/Public Partnerships
- Chesapeake Bay TMDL
  - Requires load reductions in Phosphorous, Nitrogen and Sediment
- Article XIII, Environmental Management Ordinance
  - Allows regional public stormwater ponds within RPA
- Zoning Ordinance Definition of Open Space
  - The purpose of open and usable space is to provide areas of trees, shrubs, lawns, pathways and other natural and man-made amenities which function for the use and enjoyment of residents, visitors and other persons.
- Eisenhower East Small Area Plan
  - Parks and Resource Protection Areas offer large expanses of open space for formal and informal recreation activities and should include community amenities such as nature, bike, and recreational fitness trails.

Benefits of Pond Option: *Environmental*

- Treats 70 acres of stormwater which satisfies a significant portion of the new Chesapeake Bay regulations
- Provides significantly better water quality than existing RPA
- Improves water quality downstream and reduces variations in flow
- Provides vegetated habitat for variety of wildlife

Ecological and Recreational Comparison of Options

	RPA Option	Stormwater Pond Option
Park Experience	Passive	Passive
Trails	One at edges of meadow	Two: one at waters edge and one nearer the building
Habitat	Wildflower Meadow, grasses	Wetland shelf submerged grasses and reeds
		Open water – fish and other aquatic organisms
	Benthic Macro-Invertebrates	Benthic organisms - decomposers
Tree Canopy	Limited	Limited
Bird Species	Canopy and meadow species	Canopy, wetland and open water species
Water Quality	No change in Hydrology	Improves water quality downstream (20-30%) and dampens variation in flows
	Water quality improvements for **3 ac.**	Water quality improvements for **70 ac.**

Timeline and Next Steps

- Planning Commission and City Council – June 2013
- Final Site Plan and Building Permit Review – Summer and Fall 2013
- Start Construction Winter 2013/2014
- Building and Pond Complete - 2016

Comments From Paradigm