District of Columbia Water and Sewer Authority
David L. Gadis, CEO and General Manager

Briefing on:

DC Clean Rivers Project:

Green Infrastructure Practicability Assessment Webinar

June 11, 2020

DCWATER.COM

Agenda

- Background
- Rock Creek Practicability Assessment
- Potomac Practicability Assessment
- Next Steps

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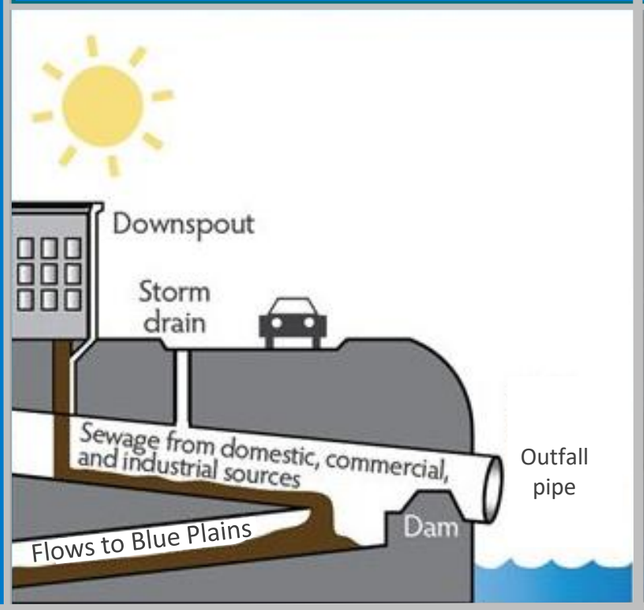
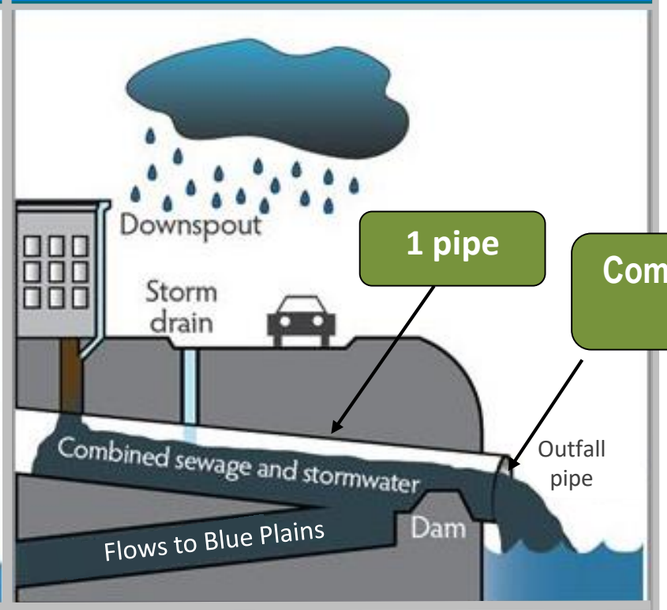
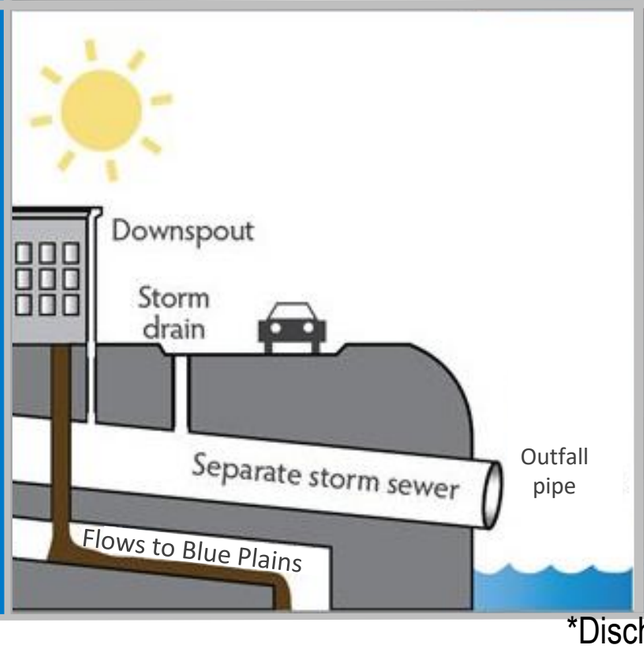
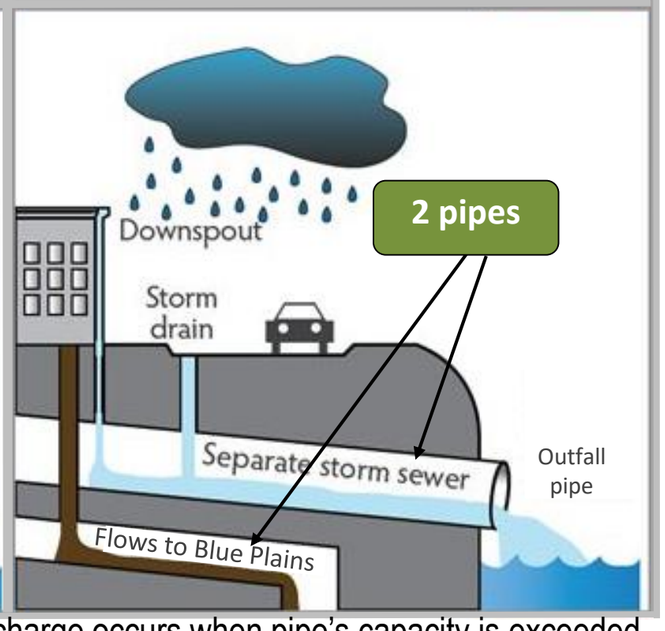
CLEAN RIVERS BACKGROUND

Sewer Systems in DC

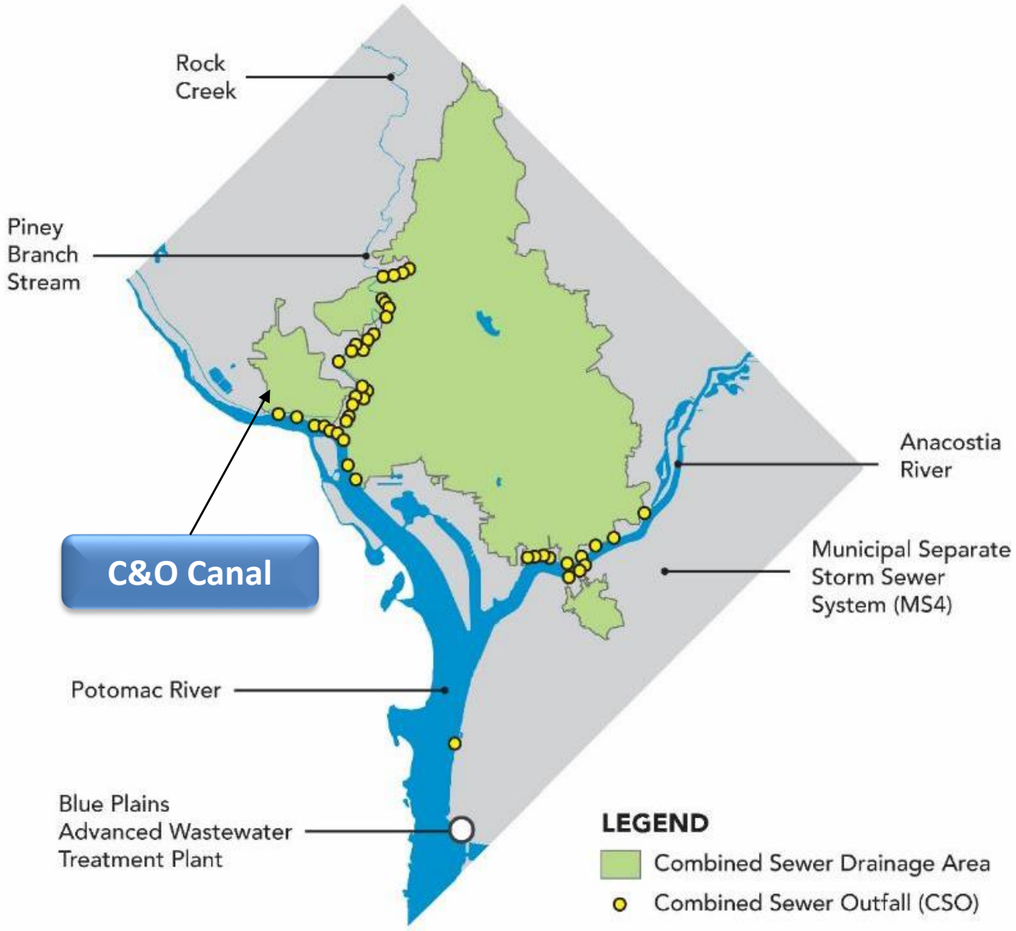
	Sunny Day	Rainy Day*
Combined Sewer System		
Separate Sewer System		

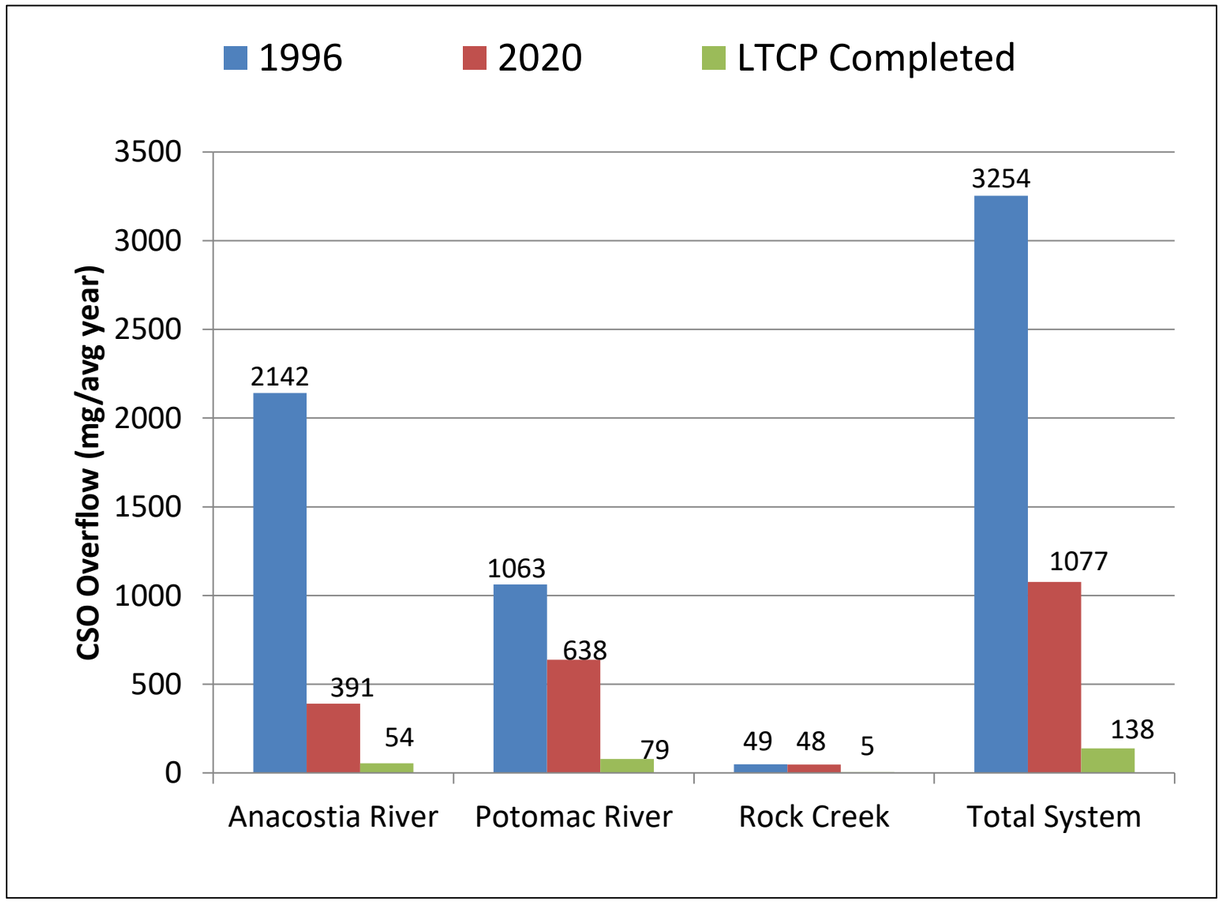
*Discharge occurs when pipe's capacity is exceeded

What is in a CSO?

- Human waste
- Gray water from:
  - Shower
  - Dishwasher
  - Kitchen
  - Laundry
  - Businesses
  - Etc.

Combined Sewer Locations





- Combined Sewer System covers 1/3 of the District (12,478 acres)
- 48 potentially active CSO outfalls
  - 15 to Anacostia
  - 10 to Potomac
  - 23 to Rock Creek

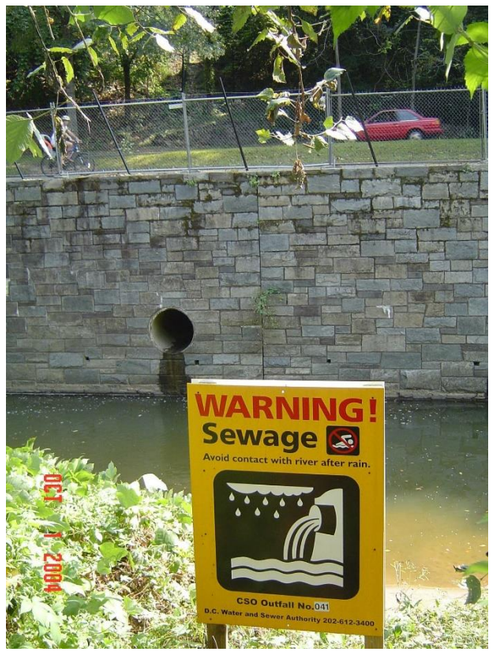
96% reduction system wide
98% reduction on Anacostia River

CSOs and Surface Flooding

CSO Discharge to Anacostia River

Trash in Anacostia River

Piney Branch CSO Discharging



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Rhode Island & T St NW

Photo courtesy of myfox.com

Rhode Island & T St NW

Photo source unknown

Rhode Island Between 1st & 2nd St NW

Photo courtesy of huffintonpost.com

Photo courtesy of: Greg Roberts

Rhode Island & 1st St NW

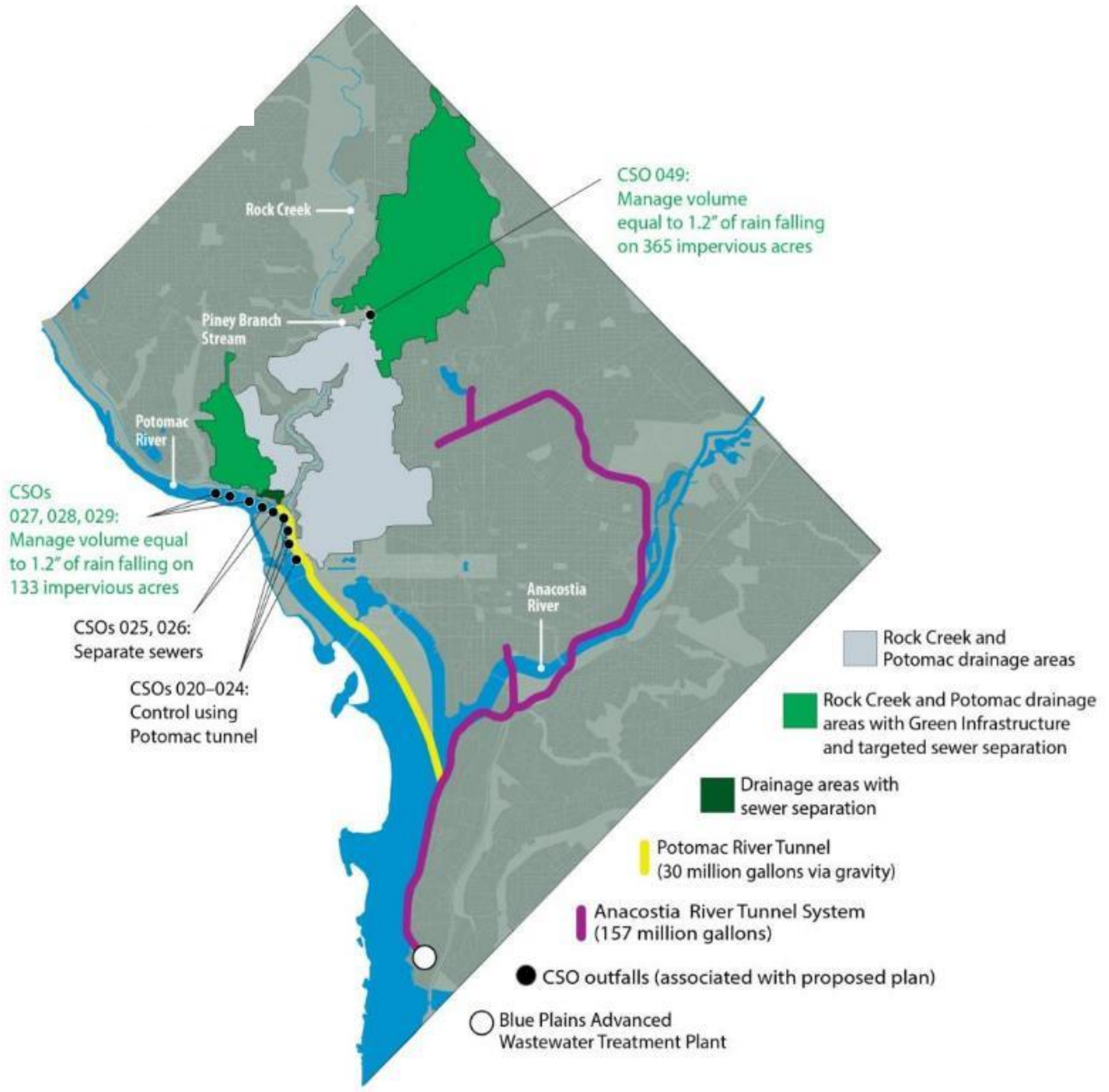
Photo source unknown

CSO 049 Overflowing

1st & V St NW

Clean River Project

- **Clean Rivers Project: $2.7 Billion**
- **Nitrogen Removal: $950 Million**
- **Total > $ 3.5 Billion**



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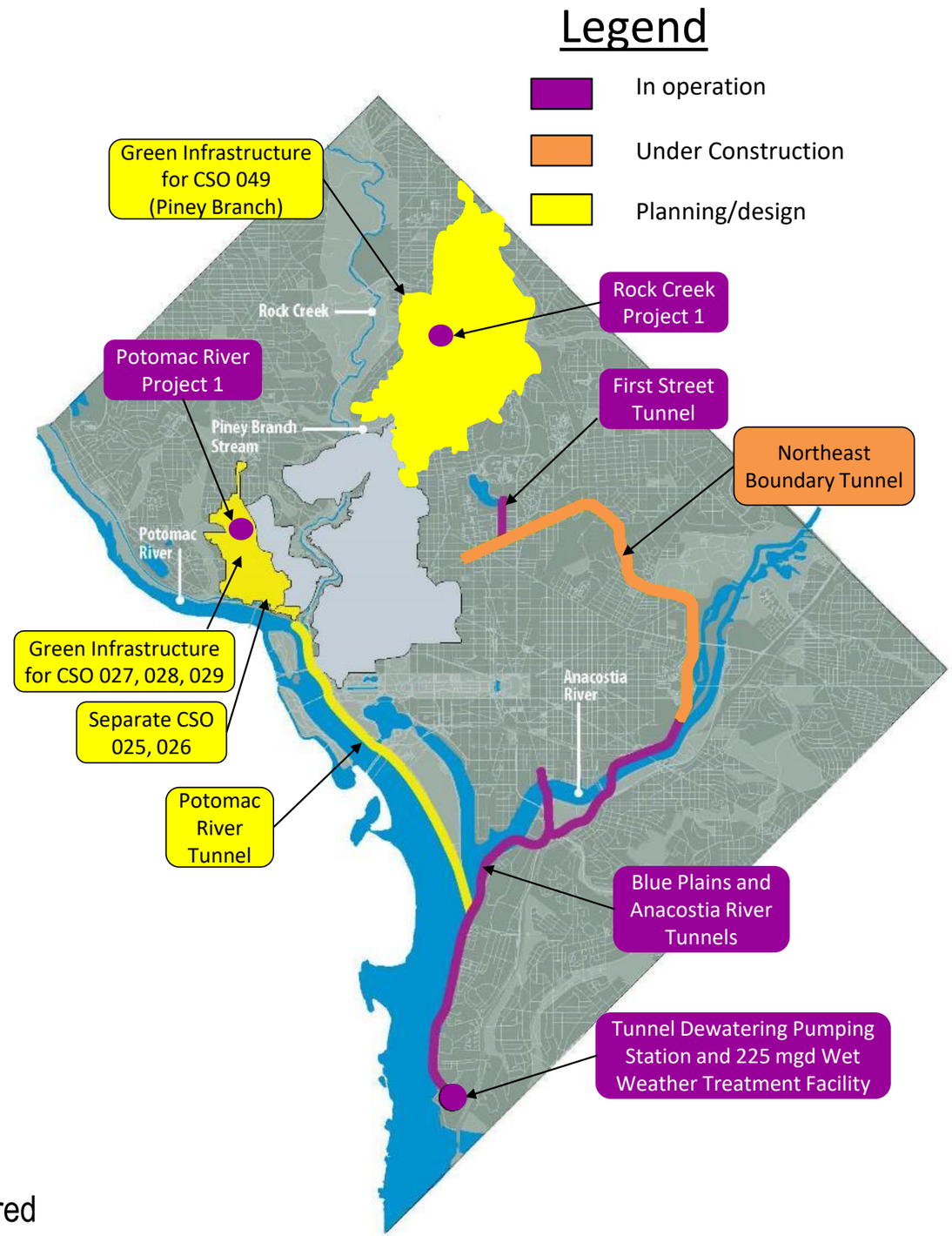
Program Status

No.	Month	Rainfall, DCA Gauge (in)	Volume Captured by Tunnel (MG)	Measured Overflow (MG)	% captured	Solids Removed (tons)
1	March 20 -31, 2018	1.48	20	0	100%	8
2	April 2018	3.59	249	10	96%	
3	May 2018	8.73	860	13	98%	72
4	June 2018	5.21	265	47	85%	55
5	July 2018	9.73	679	260	72%	10
6	August 2018	5.19	334	14	96%	226
7	September 2018	9.73	784	116	87%	94
8	October 2018	3.06	164	0	100%	151
9	November 2018	7.57	777	5	99%	89
10	December 2018	5.82	468	100	82%	165
11	January 2019	3.30	259	0	100%	99
12	February 2019	3.52	74	0	100%	191
13	March 2019	4.00	337	46	88%	48
14	April 2019	2.24	77	0.1	100%	384
15	May 2019	4.97	311	1	100%	357
16	June 2019	4.27	134	0.1	100%	268
17	July 2019	6.49	339	77	81%	139
18	August 2019	1.99	186	22	89%	165
19	September 2019	0.25	19	0	100%	78
20	October 2019	6.66	450	18	96%	67
21	November 2019	1.37	55	0	100%	131
22	December 2019	2.80	80	0	100%	227
23	January 2020	2.79	150	0	100%	120
24	February 2020	3.21	143	0.6	100%	159
25	March 2020	2.31	38	0	100%	238
26	April 2020	6.30	338	127	73%	139
27	May 2020 (DRAFT)	2.49	169	0	100%	191
28	June 2020 (DRAFT, thru 6/8)	1.92	187	0	100%	TBD
	Total	**120.99**	**7943**	**859**	**90%**	**3871**

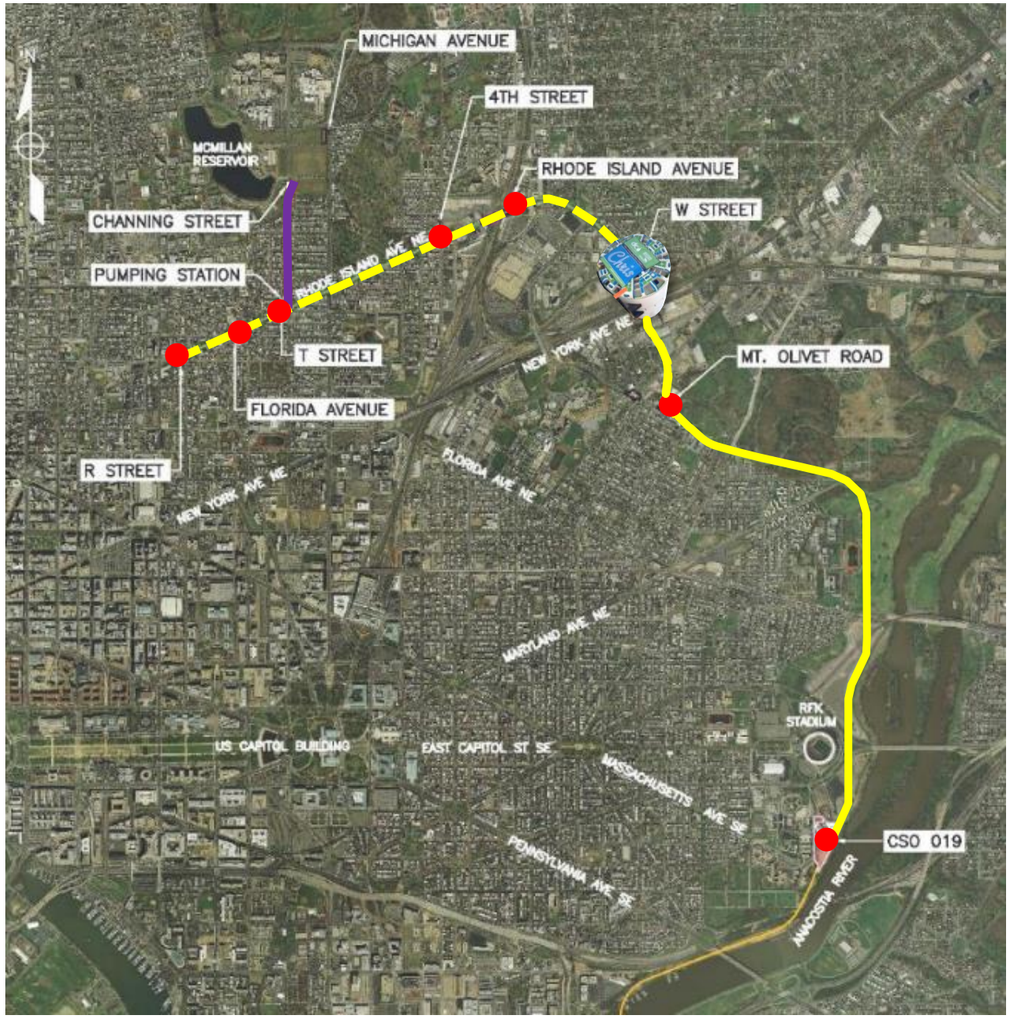


- Over **7.9 billion gallons** captured to date
- Over **3,800 tons** of trash, debris, and other solids captured
- Exceeding predicted capture rate (>80%)
- First year in operation (2018) was the wettest year on record for DC

Northeast Boundary Tunnel (under construction)

- 23 foot diameter tunnel, 27,000 feet long
- 7 shafts, 5 diversion chambers
- Construction value: $580 M
- Place in operation: 2023

W Street Shaft
Break-in, 4/15/20

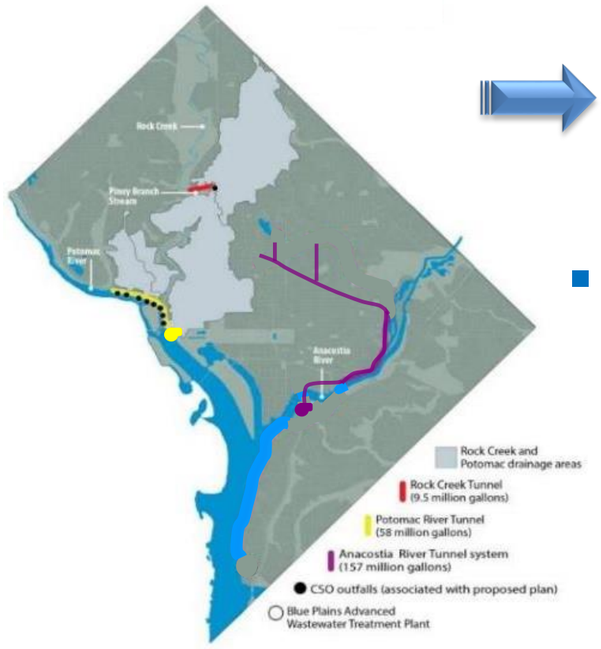


Adds 90 million gallons to existing 100 million gallons of Anacostia Tunnel

GREEN INFRASTRUCTURE PRACTICABILITY ASSESSMENT

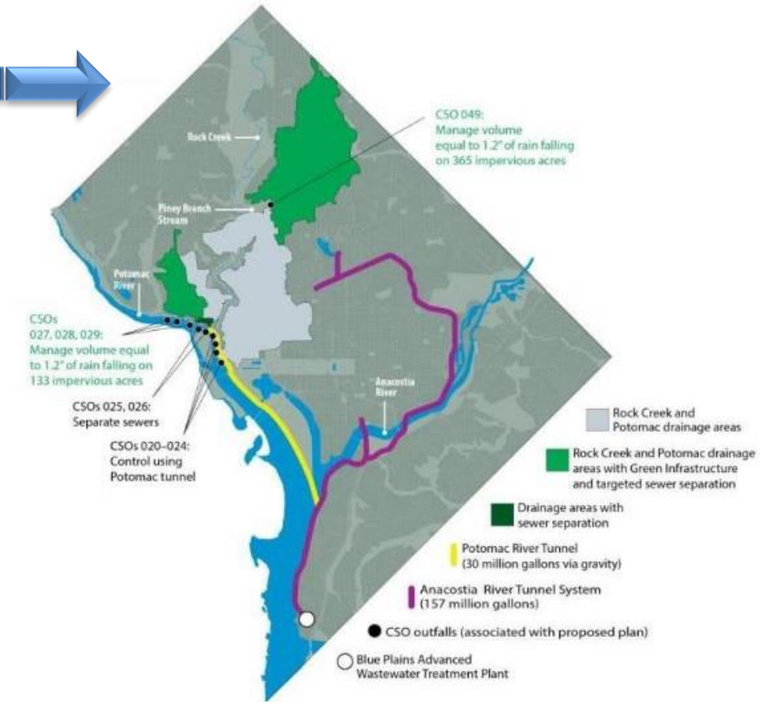
Green Roof at Fort Reno Reservoir

Consent Decree Change for Green Infrastructure



Consent Decree modification entered in Federal Court January 14, 2016

- Rationale:
  - Test GI on large scale
  - GI offers Triple Bottom Line benefits:
    - Economic
    - Environmental
    - Social
  - National Green Infrastructure Certification Program for local jobs
  - Gravity tunnel eliminates deep tunnel pumping station



One of the highest CSO reductions in the country:

Condition	Anacostia River	Potomac River	Rock Creek	Total
Overflow Volume (mg/avg year)				
1996 – DC Water Formed	2,142	1,063	49	3,254
LTCP Complete	54	79	5	138
% reduction	**98%**	**93%**	**90%**	**96%**
CSO Frequency (#/avg yr)				
1996 – DC Water Formed	82	74	30	82
LTCP Complete	2	4	1 / 4[1]	4

Note 1: One overflow at Piney Branch, 4 overflows at other Rock Creek CSOs

DOEE and EPA determined that LTCP meets District Water Quality Standards, subject to post construction monitoring

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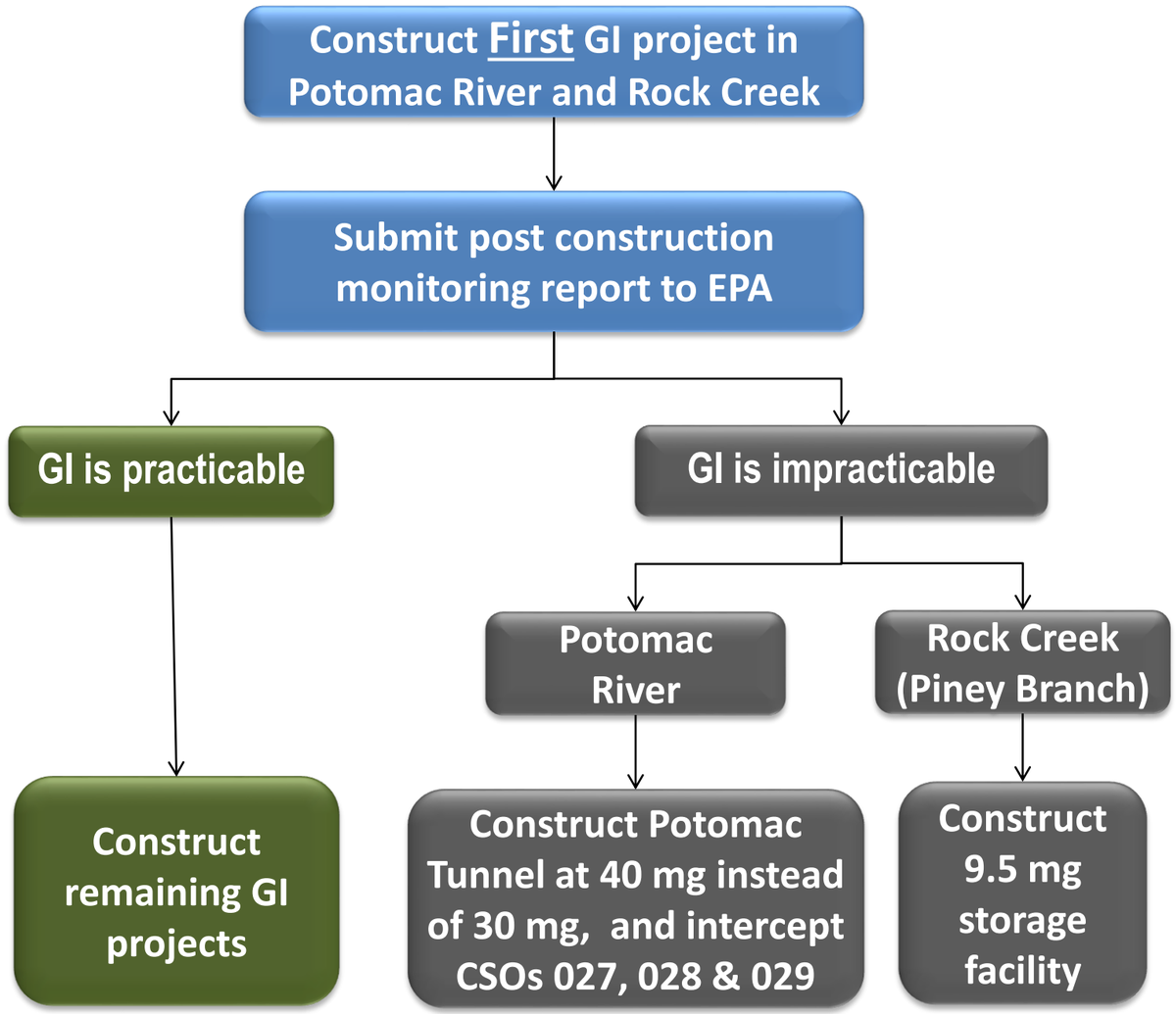
GI Practicability Assessment

<u>Rationale:</u> GI not constructed on a large scale with high CSO reduction, documented case histories with cost and performance not available, need time to learn

Project	Impervious Acres Managed @ 1.2”	Place in Operation Deadline
Potomac River Project 1	44	2019
Practicability assessment – due Aug. 17, 2020		
Potomac River Project 2	46	2024
Potomac River Project 3	43	2027
Subtotal	**133**	
Rock Creek Project 1	20	2019
Practicability assessment – due Jun. 15, 2020		
Rock Creek Project 2	75	2024
Rock Creek Project 3	90	2027
Rock Creek Project 4	90	2029
Rock Creek Project 5	90	2030
Subtotal	**365**	
Grand Total	**498**	



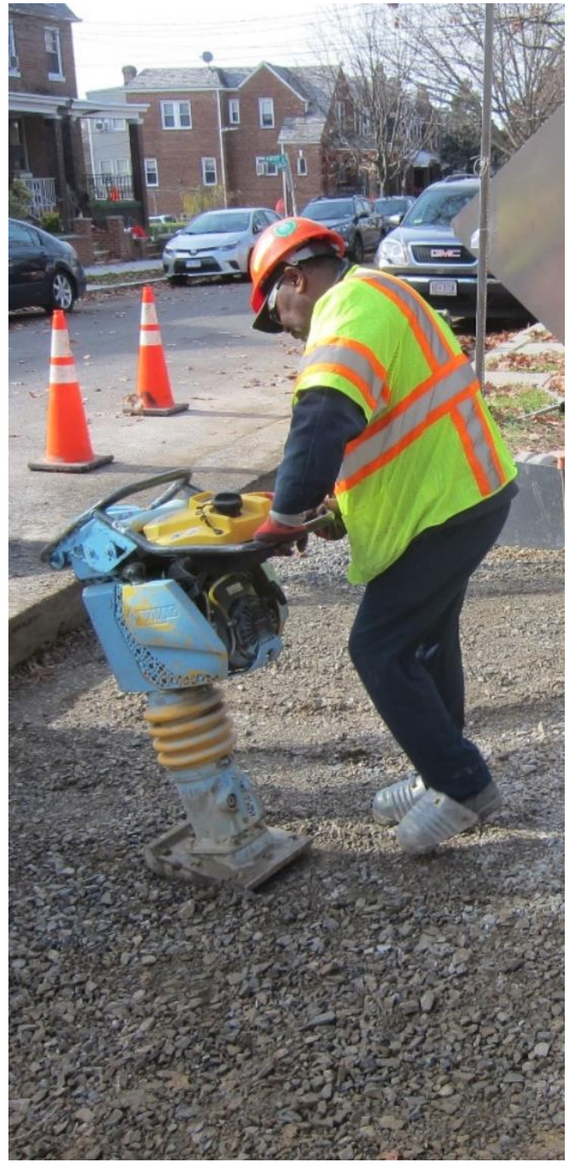
Other Considerations

- Decree requires practicability determination to consider "*constructability, operability, efficacy, public acceptability and cost per impervious acre treated*"

- EPA has 180 days to approve or disapprove DC Water's practicability determination

- DC Water can take credit for other acres controlled pursuant to District's Stormwater regulations provided "DC Water, the District or a private party has assumed operation and maintenance responsibilities in a legally binding document or as part of its statutory or regulatory authority"

- Regardless of the Determination decision, DC Water required to operate and maintain the GI Project 1 sites



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DC Water has Spared no Effort to Make GI Successful

More than **$80 M and several hundred thousand person-hours** have been spent on GI

- Potomac River Project A
- Rock Creek Project A
- Alleypalooza Partnership with DDOT
- Downspout Disconnection
- DC Water Design Challenge
- Utility Protection Guidelines
- DC Water Green Infrastructure Construction Standards
- DDOT Green Infrastructure Standards
- National Green Infrastructure Certification Program
- Seed money to fund WEF, UDC to train new workers
- Blanket permit Negotiated with DOEE and DDOT
- Standard Designs for Alley Porous Pavement and Bioretention
- Extensive pre and post construction modeling and monitoring
- GI Parks Project
- GI Project Planning and Education with DC Schools & Georgetown University

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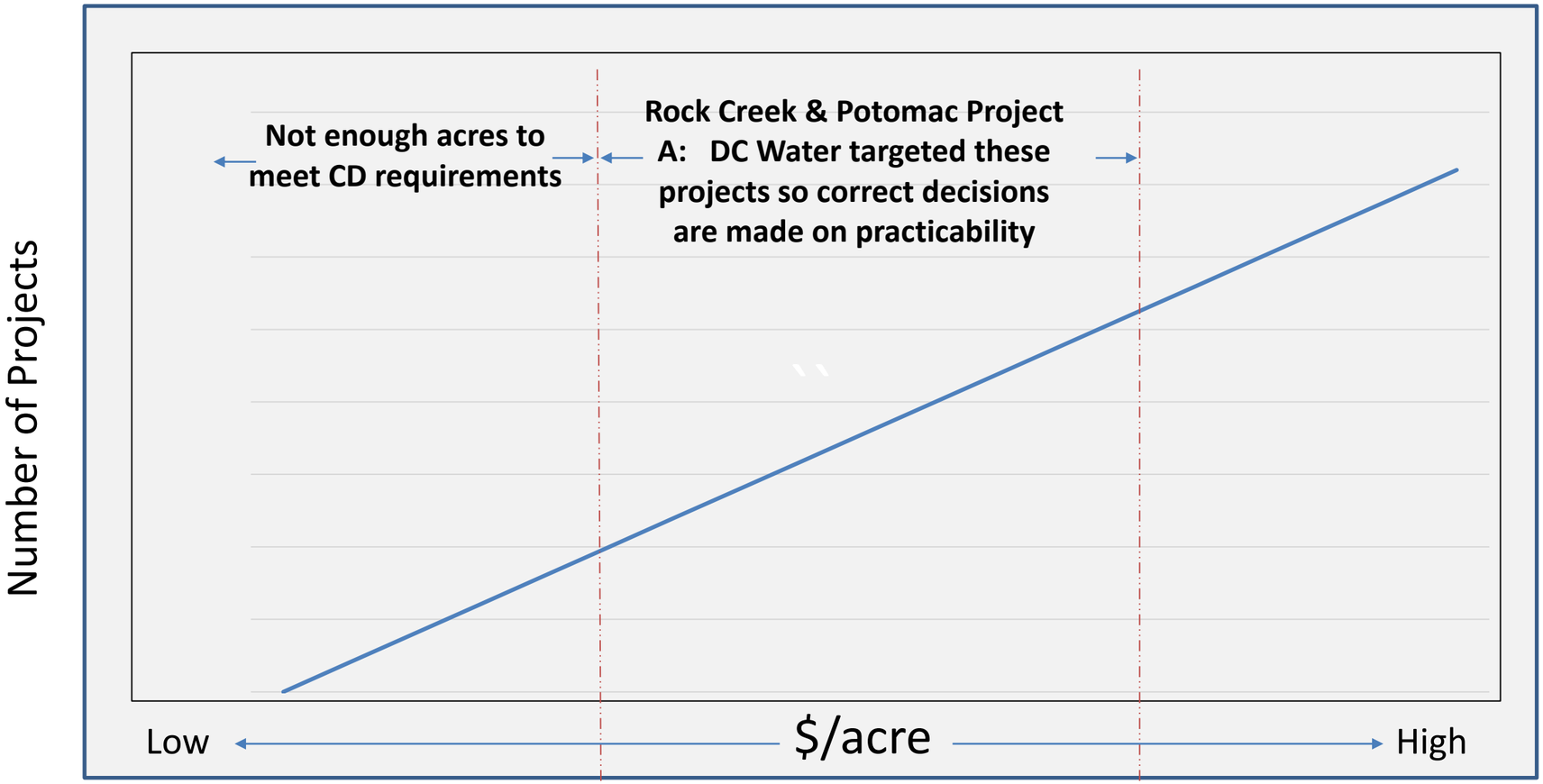
GI Projects – Parks

Green Infrastructure Cost Ranges



Targeted:

- "Low hanging fruit"
- Construct as part of a District Project

Adapted to Public Space:

- Adjust practices to space available
- Representative of typical city blocks

Retrofit Public Space

- Change public space
- Utility Relocation

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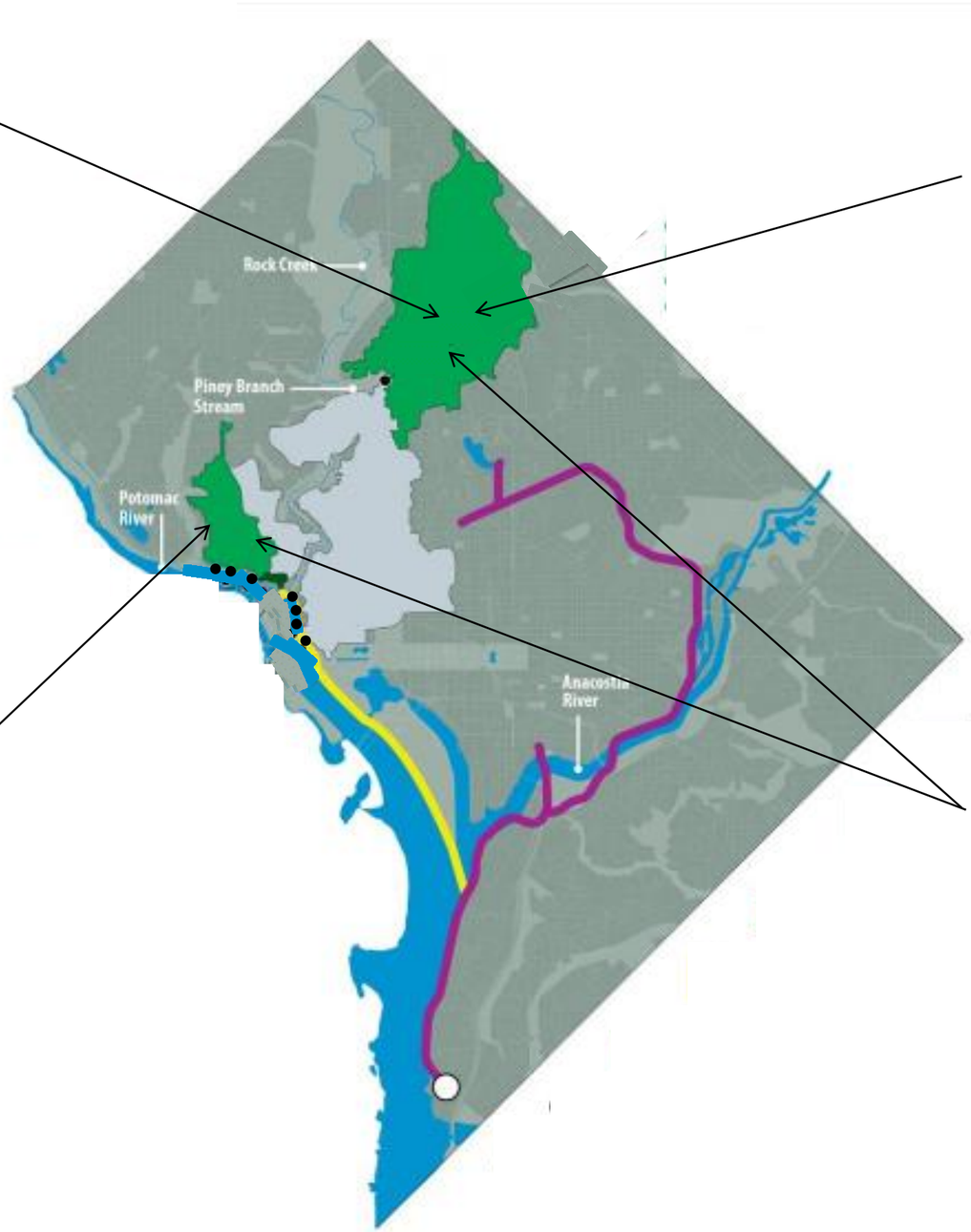
Adaptive Management Approach: Projects Used to Assess Practicability

Rock Creek Project A

- 22 acres constructed and operated for a year
- 38 bioretention facilities
- 39 porous pavement facilities
- 2 other facilities

Potomac River Project A

- 8 acres constructed and operated for a year
- 5 bioretention facilities
- 38 porous pavement facilities



Alleypalooza Partnership w/DDOT

- Partnership to incorporate green alleys in Alleypalooza work
- 7 alleys managing 3 acres of runoff

Downspout Disconnection

- 6,471 homes visited, 293 homes participated
- 1.2 acres managed

Rock Creek Qualitative Assessment of GI

Criteria	Assessment	Basis
Constructability	Good	• Projects are constructible with normal construction practices
Public Acceptance	Good	• Survey conducted of homes in project area • Survey results: 64% of residents would like more GI in their neighborhood
Efficacy	Good	• Can be designed and constructed to perform as predicted • Lessons learned can be applied going forward
Operability	Moderate	• Maintenance is simple, but is essential to assure performance • If not maintained adequately, performance can suffer
Cost Effectiveness • Targeted GI	Good	• Cost can be competitive with gray
Cost Effectiveness • Retrofit Public Space	Negative	• Costs much higher than gray
Other – Triple Bottom Line and Economic Benefits	Good	• Community and economic benefits substantially higher with Green Infrastructure
Other – Protection of future infrastructure (GI MOU)	Moderate	• Agreement with District not reached on GI MOU

Rock Creek Quantitative Assessment of Alternatives

Alt.	Description		Capital Cost ($M)	O&M Cost ($M/yr)	NPV 30 years ($M)	% Over Low
1	All Gray (9.5 mg storage)		$ 185	$ 0.28	$ 211	**+2%**
2	All Green (365 ac of GI) • 27.4 ac Project 1 • 266.6 new ac • 71 ac DC Stormwater Regs 365 ac total		$ 206	$ 4.3	$ 401	**+94%**
3	Hybrid (9.5 mg) • 92 ac of GI (27 ac Project 1 + 65 new ac, including downspout disconnect • Gray storage • BMPs per DC Stormwater Regs Total	3.0 mg 4.2 mg 2.3 mg 9.5 mg	$ 133	$ 1.5	$ 207	**0%**

Recommended

Hybrid alternative achieves:

- **Same level of control as LTCP**
- **Equivalent total storage volume (9.5 mg) with green + gray together**

Recommendation:

- **Most cost effective approach**
- **Provides CSO performance certainty**
- **Maintains DC Water stature being green leader utility**
- **Submit practicability proposing hybrid approach**

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Rock Creek: Predicted CSO Performance

CSO Performance at Piney Branch (CSO 049):

Parameter	Before LTCP	LTCP
No. Overflows (#/average year)	25	1
Overflow Volume (million gallons/average year)	39.7	1.4
% Reduction from Before LTCP	--	96%

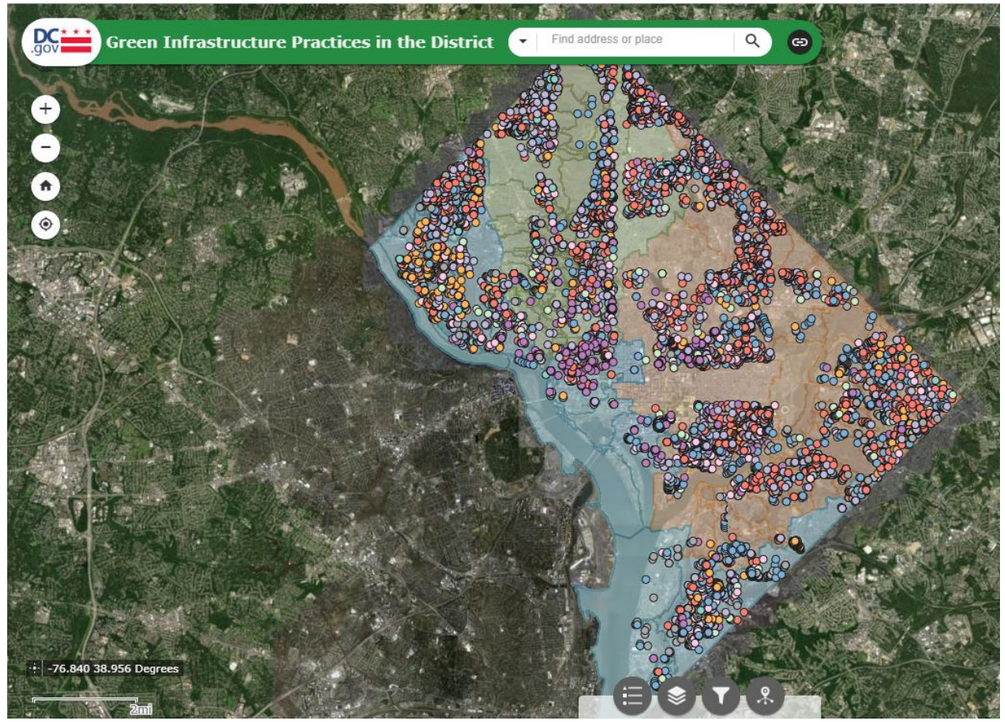
- Proposed plan provides **same performance as LTCP**
- Same performance that was determined to meet water quality standards by DOEE and EPA

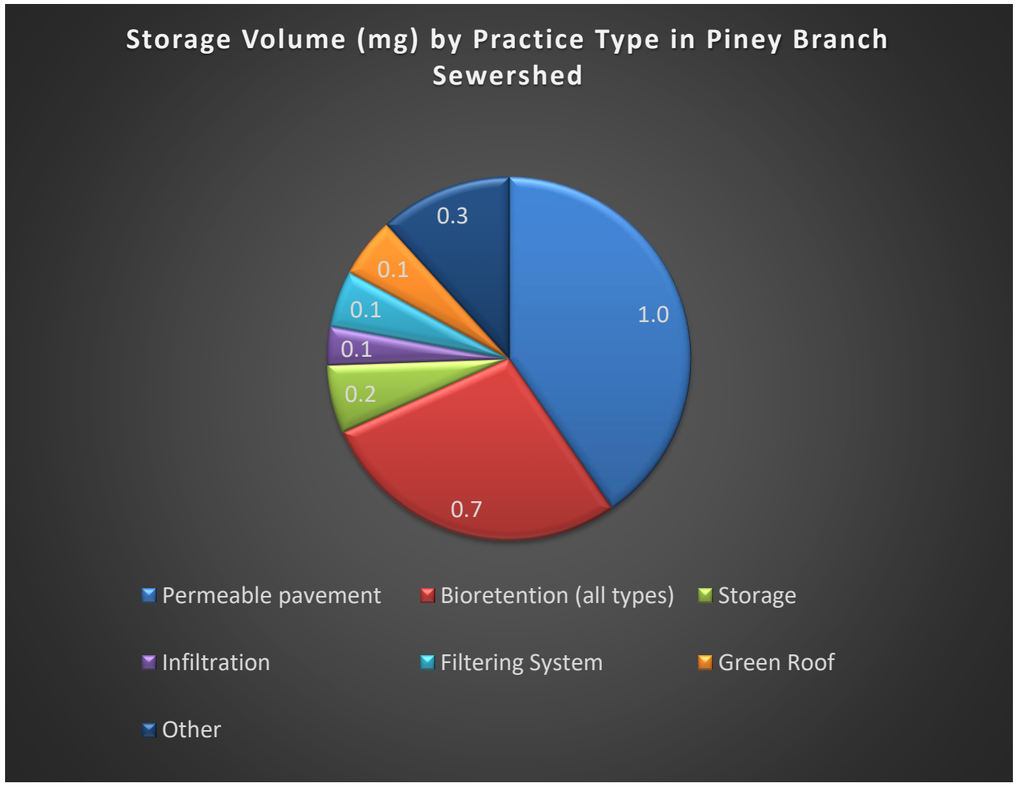
GI Constructed per District's Stormwater Regulations

- Decree language: *"DC Water can take credit for other acres controlled pursuant to District's Stormwater regulations provided "DC Water, the District or a private party has assumed operation and maintenance responsibilities in a legally binding document or as part of its statutory or regulatory authority"*

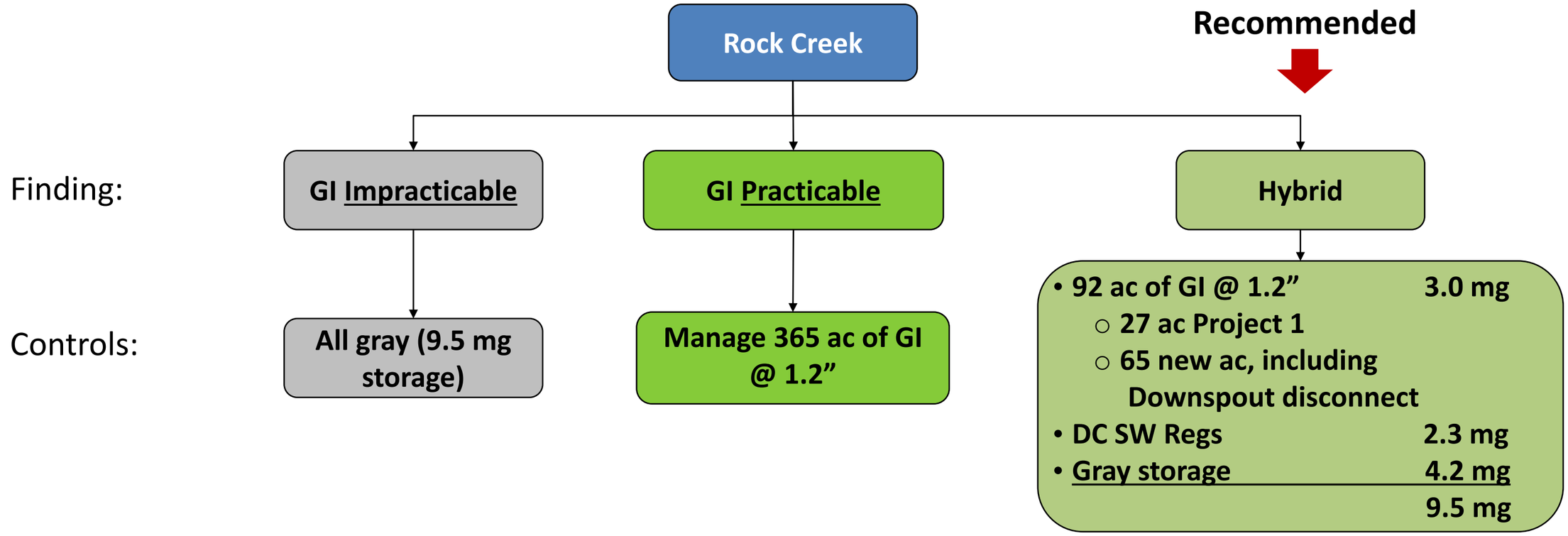
- District reports covenants in place after 1999 that convey with property
  - Obligation to keep and maintain practices

Period	# Practices	Storage Vol. (mg)
After 2002 (after LTCP monitoring)	244	2.32



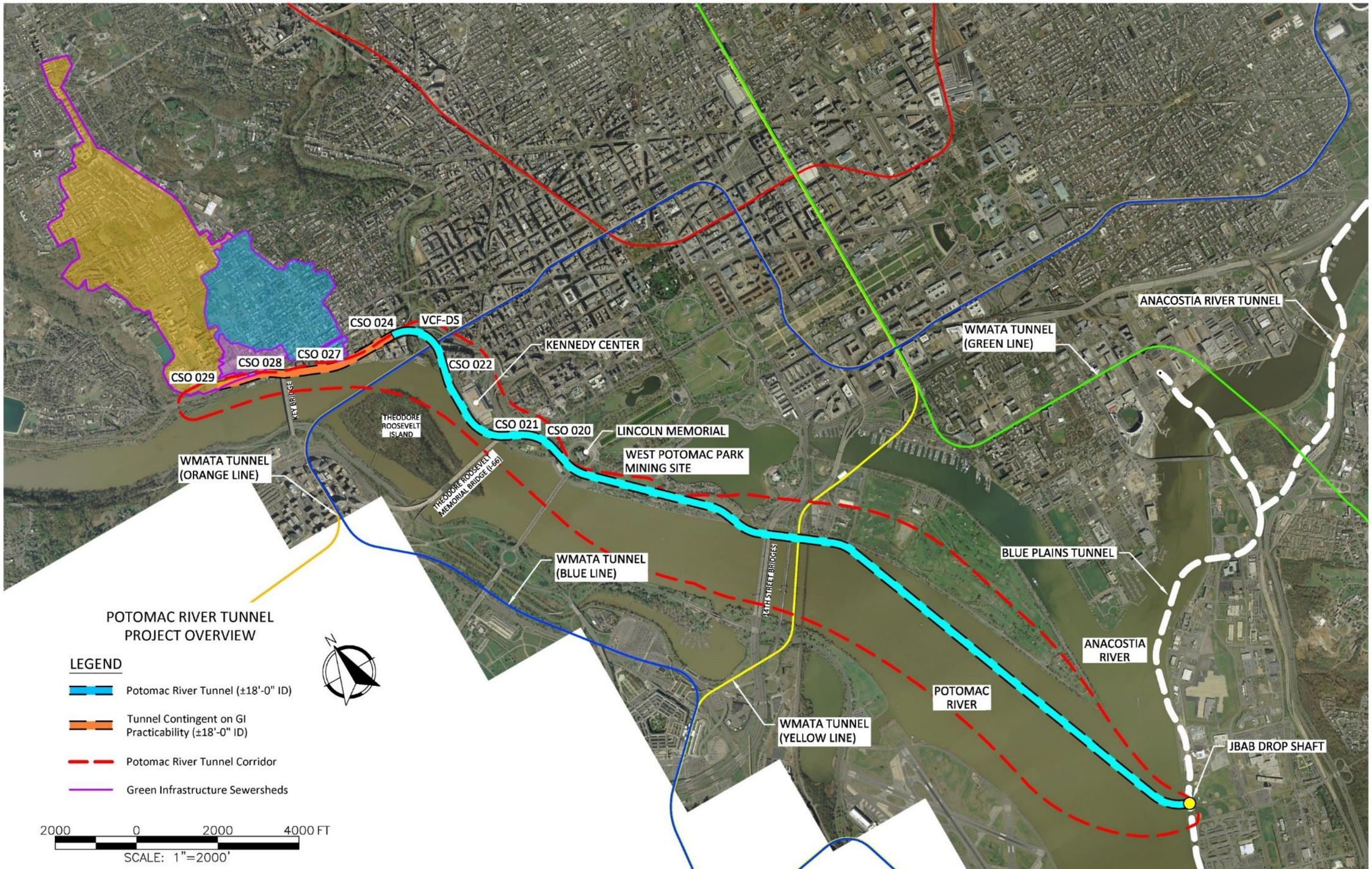


Recommended Approach for Rock Creek



Degree of CSO Control:	Same as LTCP	Same as LTCP	Same as LTCP
Technologies:	Same as LTCP	Same as LTCP	Same as LTCP
Schedule:	Same as 2016 Amended Decree, by 3/23/2030	Same as 2016 Amended Decree, by 3/23/2030	Same as 2016 Amended Decree, by 3/23/2030

Potomac GI Area Addresses Three CSO areas: CSO 027, 028 and 029



Potomac Qualitative Assessment of GI

Criteria	Assessment	Basis
Constructability	Negative	• Limited space in Georgetown area • GI not constructible in CSO 027 and 028
Public Acceptance	Negative	• Objections in Historic District, significant opposition from Commission of Fine Arts, Old Georgetown Board, National Capital Planning Commission, DC State Historic Preservation Office, Advisory Neighborhood Commission and residents
Efficacy	Good	• Can be designed and constructed to perform as predicted
Operability	Moderate	• Maintenance is simple, but is essential to assure performance • If not maintained inadequately, performance can suffer
Cost Effectiveness	Negative	• Extremely high costs to construct green infrastructure in historic District
Other – Triple Bottom Line and Economic Benefits	Negative	• Due to lack of space, most GI would be porous pavement (not green) with little triple bottom line benefit
Other – Protection of future infrastructure (GI MOU)	Moderate	• Agreement with District not reached on GI MOU

Potomac Hybrid Quantitative Assessment of Alternatives

Alt.	Description	Capital Cost ($M)	O&M Cost ($M/yr)	NPV 30 years ($M)	% Over Low
1	Extend Potomac Tunnel from CSO 027/028 to CSO 029	$ 28	$ 0.07	$ 31	**0%**
2	• Potomac Tunnel stops at CSO 028 • Green Infrastructure for CSO 029	$ 25	$0.50	$ 49	**+58%**

Recommended

Potomac Conclusion:

- GI is not practicable in CSO 027 and 028 due to historic district and community concerns
- In CSO 029, GI is approximately equivalent on a capital cost basis, but is 58% more expensive on a NPV basis
- GI constructed in CSO 029 is mostly alleys – minimal green expression and minimal triple bottom line community benefits
- **Recommendation: submit practicability stating GI is *impracticable* on Potomac**

Next Steps

- Rock Creek Practicability Report to be submitted by June 15, 2020
- EPA has 180 days to approve/disapprove
- Report will be available after June 15 on DC Water's website: https://www.dcwater.com/green-infrastructure
- Questions? E-mail us at cleanriversgi@dcwater.com