

Baltimore City Department of Public Works



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MAYOR

BALTIMORE CITY

DPW

DEPARTMENT OF PUBLIC WORKS
RUDOLPH S. CHOW, P. E.
DIRECTOR



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WIP Project Delivery Options

**Municipal Separate Storm Sewer System Permit (MS4)
Watershed Implementation Plan (WIP)
Accelerating NPDES MS4 Projects
Project Delivery**

By

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PRIME AE Group

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Agenda

- **Background & Project Overview**
- **WIP - Project Locations**
- **MS4 WIP Challenges**
- **MS4 Program - WIP Strategy**
- **Types of WIP Projects**
 - Structural / Traditional BMPs
 - Environmental Site Design (ESD)
 - Alternative BMPs (Stream Restoration)
 - Alternative BMP (Impervious Area Removal/Lot Greening)
- **Current Program Status**
- **Contract Procurement Project Delivery**
- **Looking Forward**
- **Questions**



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Background & Project Overview

- **City of Baltimore's MS4 Permit**
 - Permit issued **December 27, 2013**
 - Completion is **December 27, 2018**
 - City will restore over **4,041 acres of impervious surface area** by December 2018 to meet the required strategies to meet the 20% restoration goal
 - **1,191 equivalent impervious acres** by installing stormwater management projects including traditional Best Management Practices (BMPs), Environmental Site Design (ESD) practices, and Alternative BMPs
 - **2,766 equivalent impervious acres** by employing a variety of programs to improve water quality, including mechanical street sweeping, preventive inlet cleaning, and IDDE
 - **279 equivalent impervious acres** by fostering partnerships to encourage private development of stormwater management
 - Estimated cost for all projects combined approximately **\$80 million**



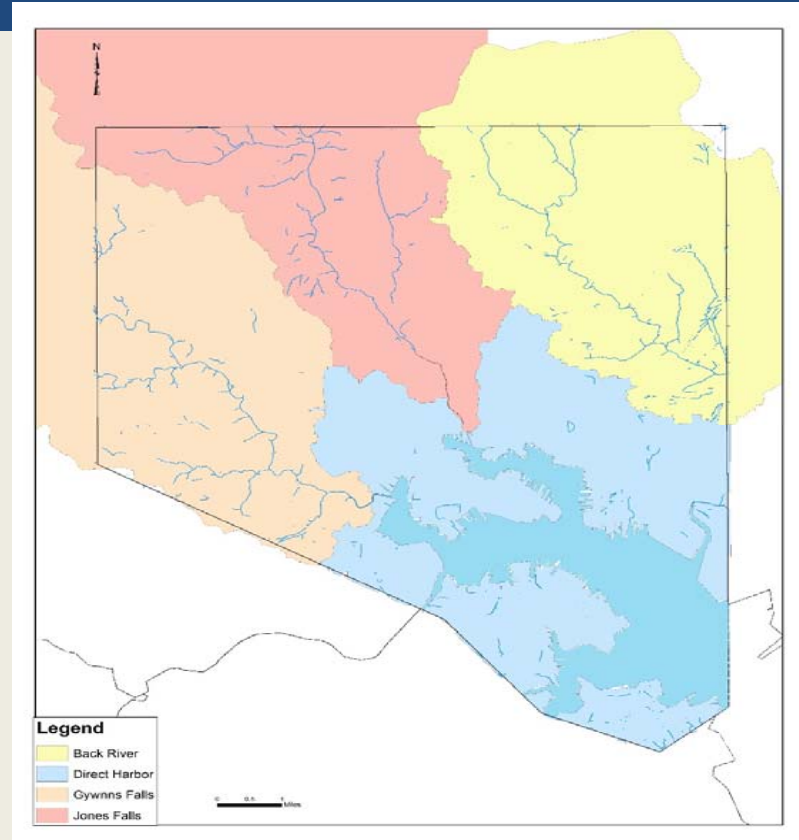
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Background & Project Overview (Cont.)

4 Major Watershed

MS4 - WIP Type of Projects in each Watershed						
Project Type	Back River	Direct Harbor	Gywnns Fall	Jones Falls	Total Eq. Acres from WIP Target	% of Goal
Structural/Traditional BMPs	5	1	2	4	308.5	25.6%
Environmental Site Design (ESD) Practices	6	17	6	1	61.6	5.1%
Alternate BMPs (Stream Restoration)	9	0	7	5	783.2	65.0%
Alternate BMPs (Impervious Area Removal/Lot Greening)	0	10	3	8	51.6	4.3%
				Total:	1204.9	



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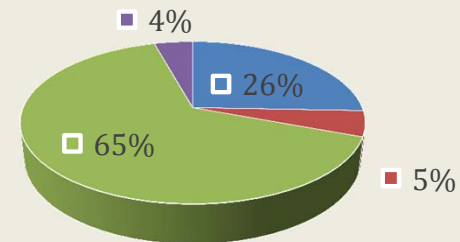


Background & Project Overview (Cont.)

MS4 - WIP Type of Projects

Project Type	# of WIP Projects	% of WIP Goal	TN % of Goal	TP % of Goal	TSS % of Goal
Structural/Traditional BMPs	12	25.6%	23.3%	6.2%	10.0%
Environmental Site Design (ESD) Practices	30	5.1%	5.3%	1.3%	1.8%
Alternate BMPs (Stream Restoration)	21	65.0%	62.8%	90.3%	85.6%
Alternate BMPs (Impervious Area Removal/Lot Greening)	21	4.3%	8.6%	2.2%	2.6%

MS4 Project Types (% of Equivalent Impervious Area Treated)



- Structural/Traditional BMPs
- Environmental Site Design (ESD) Practices
- Alternate BMPs (Stream Restoration)
- Alternate BMPs (Impervious Area Removal/Lot Greening)



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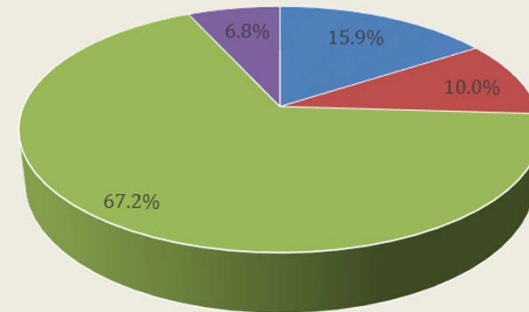


Background & Project Overview (Cont.)

Cost of MS4 - Project Types

Project Type	# of WIP Projects	% of WIP Goal	Design Cost	Construction Cost
Structural/Traditional BMPs	12	25.6%	\$ 2,443,404	\$ 13,000,000
Environmental Site Design (ESD) Practices	30	5.1%	\$ 2,555,638	\$ 7,206,477
Alternate BMPs (Stream Restoration)	21	65.0%	\$ 7,700,988	\$ 57,579,836
Alternate BMPs (Impervious Area Removal/Lot Greening)	21	4.3%	\$ 1,299,691	\$ 5,350,000
			\$13,999,721	\$ 83,136,313

Cost of MS4 Project Types



- Structural/Traditional BMPs
- Environmental Site Design (ESD) Practices
- Alternate BMPs (Stream Restoration)
- Alternate BMPs (Impervious Area Removal/Lot Greening)



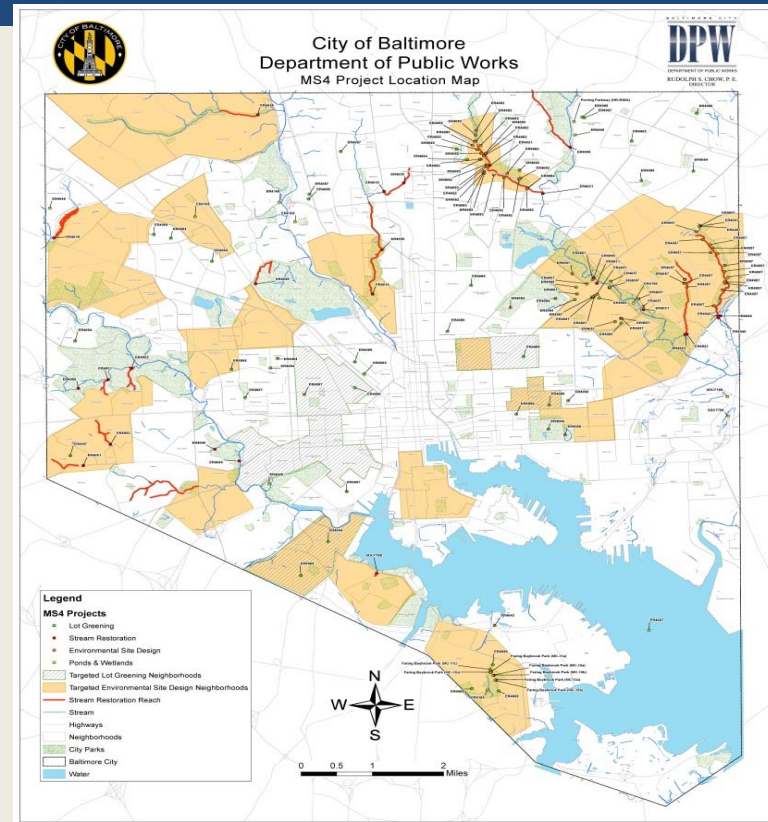
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WIP Project Locations

The WIP is a plan for achieving the 20% restoration requirement set out in the permit, in addition to attaining applicable waste load allocations (WLAs) for each established or approved Total Maximum Daily Load (TMDL) for each receiving water body.



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MS4 WIP Challenges

- Replacing infeasible projects to meet WIP goal
 - Limited public lands (School and Rec & Parks)
 - Ultra-Urban Areas (45% of the City is impervious)
 - Unfavorable topography
 - Limited spaces to install SWM facilities
 - Selecting ESD's projects
 - Design and Construction Budget
 - It took longer to negotiate design scope to meet the budget
 - Aggressive design and construction schedule
 - Resources
 - Long expenditure authorization process
- Various Permits
 - Maryland Department of the Environment (MDE)
 - United State Army Corps of Engineers (USAE)
 - Maryland Historic Trust (MHT)
 - Rec & Parks
 - Public/Private Landowners (federal agencies, Schools, MTA, CSX, etc.)
 - City Agencies (MOT, OLRA, planning, etc.)



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MS4 WIP Challenges (Cont.)

Other Challenges

- Rights of Entry for private property (ROE)
- Contractor Capacity Limitations
- Late Program Start
- Some projects that are no longer viable
- Identify replacement projects
- Contractor's Procurement Approvals
- Improve maintenance program
- Competition with other Jurisdiction to meet deadline
- Staffing



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MS4 Program – WIP Strategy

- Select Program Management Team
- Select Project Control Team
- Select Design Consultants (On Call Agreements)
 - Negotiate Standard Scopes with Selected Consultants
 - Issue Design Tasks
- Meet with Regulatory Agencies to accommodate Agencies review time.
- Finalize MOU's with MOT, Rec & Parks
- Select project locations
- Partnership with non profit organizations NGOs
- Community Outreach
- Identify necessary maintenance, adaptive management, staffing, and financial strategies to implement the WIP



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NGO & Inter-agency List

Inter-agency collaboration

- Baltimore Development Corporation
- Baltimore Housing
- Department of Planning
- Department of Public Works
- Department of Recreation and Parks
- TreeBaltimore
- Department of Transportation
- Office of the Mayor

NGO Collaboration

- Baltimore Green Space
- Baltimore Orchard Project
- Baltimore Tree Trust
- Blue Water Baltimore
- Civic Works
- Parks & People Foundation
- USDA Forest Service /
- Baltimore Ecosystem Study



MS4 Program – WIP Strategy (Cont.)

- To achieve the City’s aggressive schedule
 - Bundle the 84 projects into 28 contract to attract more qualified bidders, based on Type of WIP Projects and locations
 - Train City Staff
 - Accelerate the City permits and approvals
 - Improve communication on status of ROEs with City’s Law Department
 - Work with Procurement Office to speed up the approval process
 - Conduct contractor workshops to introduce the MS4 program
 - Select implementation methods as appropriate

C13 Pre-Construction



C13 Post-Construction



MS4 Program – WIP Strategy (Cont.)

- Selected feasible project sites prior scope negotiation.
- Update CIP Budget to reflect market conditions
- Negotiate the expedited design schedule with consultants upfront
- Prepare the expedited ROE's list ASAP

B15 Pre-Construction



B15 Post-Construction



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Types of WIP Projects

- Structural / Traditional BMPs (Treat drainage areas of 5 acres or more, such as stormwater ponds, wetlands, detention basins, infiltration swales, and sand filters. (8.8 million)
- MDE Credit 308.5Ac

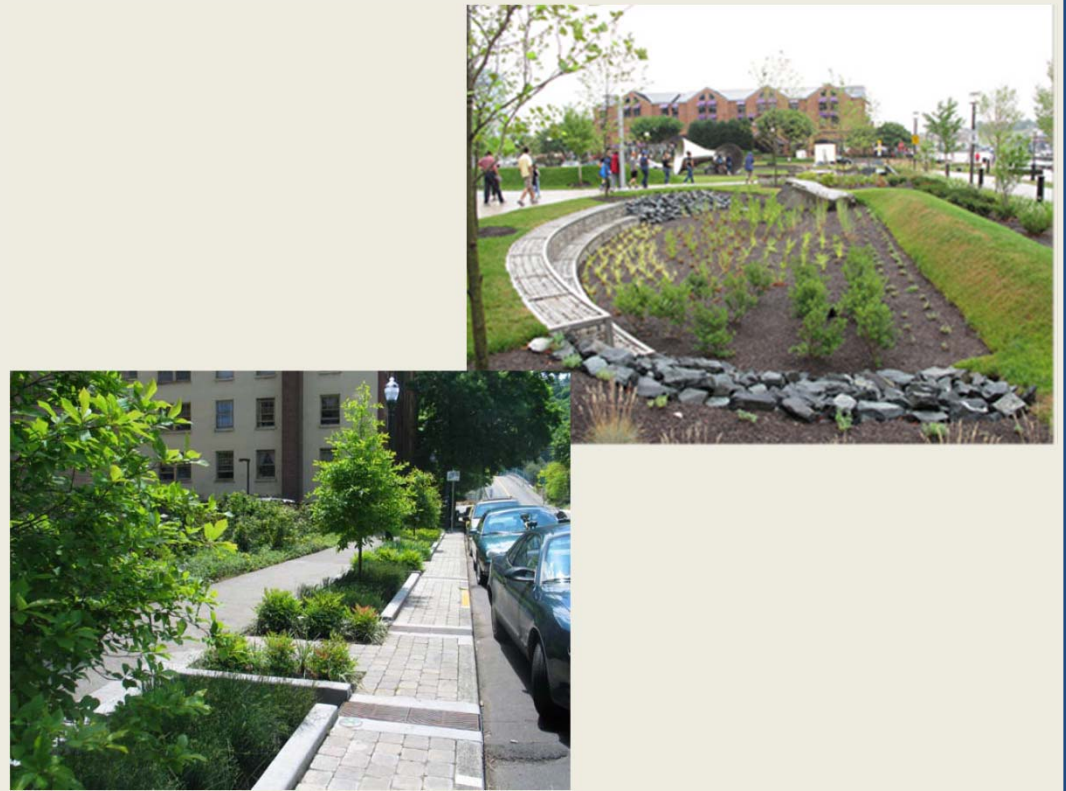


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Types of WIP Projects (Cont.)

- Environmental Site Design (ESD) Small stormwater facilities that treat 5 acres or less, including micro-bioretenention, rain gardens, enhanced filters, permeable paving, and green roofs. (8.3 million)
- MDE Credit 61.5Ac



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Types of WIP Projects (Cont.)

- Alternative BMPs (Stream Restoration)

(Opportunity to reduce erosion and sedimentation, increase natural channel flow, and improve the health of the stream and adjacent riparian areas. Approximately 9 miles of streams with cost amount 48 million

- MDE Credit 783.2Ac



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Types of WIP Projects (Cont.)

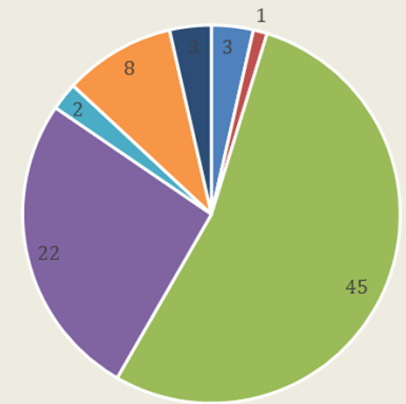
- Alternative BMP (Impervious Area Removal/Lot Greening) (Impervious surface removal and lot greening are incorporated in a combination of school projects and vacant lot restoration and re-use). 5 million
- MDE Credit 51.6Ac



Program Current Status

Phase	Equivalent Impervious Area Treatment (Acres)	# of MS4 projects	% of WIP Target
Advertisement	106.9	3	8.87%
Complete	31.2	1	2.59%
Design	631.598	45	52.42%
EAR Processing	178.2	22	14.79%
On Hold due to ROE	0	2	0.00%
Scope Negotiation	200	8	16.60%
Project to be Identified	60	3	4.98%
Grand Total	1207.898	84	100.25%
WIP Target - Equivalent Impervious Area Treatment (Acres)	1204.9		

of MS4 projects



- Advertisement
- Complete
- Design
- EAR Processing
- On Hold due to ROE
- Scope Negotiation
- Project to be Identified



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Project Delivery Method

To select a suitable project delivery method, we must carefully analyze the following:

- Project development phase
- Project needs, e.g. specialty contractors, ROW, site feasibility, etc.
- Resources and technical capability to manage the current workload



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Project Delivery Method (Cont.)

❑ Contract Procumbent Project Delivery

- Traditional Design-Bid-Build (DBB) for projects past the design stage
 - Procured early
 - Less cost
- Design/Build (DB)
 - Procured after 30% design
- Others
 - Construction Manager at Risk (CMAR)



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Program Schedule - DBB

Scenario 1: Crashed Schedule - MS4 Program (DBB)				8/1/16	10/1/16	12/1/16	2/1/17	4/1/17	6/1/17	8/1/17	10/1/17	12/1/17	2/1/18	4/1/18	6/1/18	8/1/18	10/1/18	12/1/18	2/1/19	4/1/19	6/1/19	8/1/19	10/1/19
Bundle #	Project Name	Current WIP Acres																					
1	SDC 776R Leakin Park Stream Restoration Project	31.2																					
2	ER 4097 Watershed 263 Phase 2 & 3	0.9	Procurement 2 & 4 Month			Construction 4 Month																	
3	ER 4019 East Stony Stream Restoration	12	Procurement 2 & 4 Month				Construction 12 Month																
4	SDC 7788 Seamon Ave Improvements	6.1	Design			Procurement 2 & 4 Month				Construction 12 Month													
5	ER 4131 Environmental Restoration Project 15	15.9			9 Month Design																		
6	ER 4020 Lower Lower Stony Run Stream Restoration	94	Procurement 2 & 4 Month			Re-Advertise 2 & 4 Month																	
7	ER 4125 Environmental Restoration Project 9	6.9			8 Month Design					Procurement 2 & 4 Month													
8	ER 4126 Environmental Restoration Project 10	56.5			10 Month Design					Procurement 2 & 4 Month													
9	ER 4130 Environmental Restoration Project 14	25			9 Month Design					Procurement 2 & 4 Month													
10	ER 4129 Environmental Restoration Project 13	21.9			8 Month Design					Procurement 2 & 4 Month													
11	ER 4127 Environmental Restoration Project 11	13.8			8 Month Design					Procurement 2 & 4 Month													
12	ER 4018 Powder Mill Run Stream Restoration	58.5			Design					Procurement 2 & 4 Month													
13	ER 4021 Chinquapin Run Stream Restoration	190.5			Design					Procurement 2 & 4 Month													
14	ER 4122 Environmental Restoration Project 3	69			12 Month Design					Procurement 2 & 4 Month													
15	ER 4023 Biddison Run Stream Restoration - Project 2 & 3	103.7			12 Month Design					Procurement 2 & 4 Month													
16	ER 4040 Lower Moore's Run Env1 Restoration	99.5								14 Month Design													
17	ER 4045 Gwynns Falls Pond Retrofits	15								12 Month Design													
18	ER 4046 Herring Run Ponds / Wetlands	30								12 Month Design													
19	ER 4047 Back River Park Ponds / Wetlands	25								12 Month Design													
20	ER 4050 Dead Run Stream Restoration Project 1 (Hunting Ridge)	12								12 Month Design													
21	ER 4124 Environmental Restoration Project 8	100.5								12 Month Design													
22	ER 4054 Herring Run Stream Restoration: Western Branch	90								12 Month Design													
23	ER 4107 Small SWM BMP 14	70								10 Month Design													
24	ER 4108 Small SWM BMP 15	60								10 Month Design													
Total:			1207.9																				
				31.2						32.1				44.1		66	167.0	270.4	284.2	411.7	515.4	614.9	1207.9

12/27/2018



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Program Schedule - DB

Scenario 2: DBB & DB			8/1/16	10/1/16	12/1/16	2/1/17	4/1/17	6/1/17	8/1/17	10/1/17	12/1/17	2/1/18	4/1/18	6/1/18	8/1/18	10/1/18	12/1/18	2/1/19	4/1/19	6/1/19	8/1/19	
Bundle #	Project Name	Current WIP Acres																				
SDC 7760R	Leakin Park Stream Restoration Project	31.2																				
ER 4097	Watershed 263 Phase 2 & 3	0.9	Procurement 2 & 4 Month		Construction 4 Month																	
ER 4019	East Stony Stream Restoration	12	Procurement 2 & 4 Month		Construction 12 Month																	
SDC 7788	Seamon Ave Improvements	6.1	Design		Procurement 2 & 4 Month		Construction 12 Month															
ER 4131	Environmental Restoration Project 15	15.9	9 Month Design				Construction 12 Month															
ER 4020	Lower Lower Stony Run Stream Restoration	94	Procurement 2 & 4 Month			Re-Advertise 2 & 4 Month		Construction 12 Month														
ER 4125	Environmental Restoration Project 9	6.9	8 Month Design				Procurement 2 & 4 Month		Construction 8 Month													
ER 4126	Environmental Restoration Project 10	56.5	10 Month Design					Procurement 2 & 4 Month		Construction 8 Month												
ER 4130	Environmental Restoration Project 14	25	9 Month Design				Procurement 2 & 4 Month		Construction 8 Month													
ER 4129	Environmental Restoration Project 13	21.9	8 Month Design			Procurement 2 & 4 Month		Construction 8 Month														
ER 4127	Environmental Restoration Project 11	13.8	8 Month Design			Procurement 2 & 4 Month		Construction 8 Month														
ER 4018	Powder Mill Run Stream Restoration	58.5	Design		Procurement 2 & 4 Month		Construction 14 Month															
ER 4021	Chinquapin Run Stream Restoration	190.5	Design			Procurement 2 & 4 Month		Construction 24 Month														
ER 4122	Environmental Restoration Project 3	69	12 Month Design				Construction 12 Month															
ER 4023	Biddison Run Stream Restoration - Project 2 & 3	103.7	12 Month Design				Construction 12 Month															
ER 4040	Lower Moore's Run Env't Restoration	99.5	14 Month Design					Construction 12 Month														
ER 4045	Gwynns Falls Pond Retrofits	15	12 Month Design				Construction 11 Month															
ER 4046	Herring Run Ponds / Wetlands	30	12 Month Design				Construction 11 Month															
ER 4047	Back River Park Ponds / Wetlands	25	12 Month Design				Construction 11 Month															
ER 4050	Dead Run Stream Restoration Project 1 (Hunting Ridge)	12	12 Month Design				Construction 11 Month															
ER 4124	Environmental Restoration Project 8	100.5	12 Month Design				Construction 11 Month															
ER 4054	Herring Run Stream Restoration: Western Branch	90	12 Month Design				Construction 11 Month															
ER 4107	Small SWM BMP 14	70	10 Month Design				Construction 11 Month															
ER 4108	Small SWM BMP 15	60	10 Month Design				Construction 11 Month															
Total:		1207.9	31.2				32.1				44.1		66	236.0	443.1	556.4	1017.4				1207.9	

12/27/2018

DBB

DB



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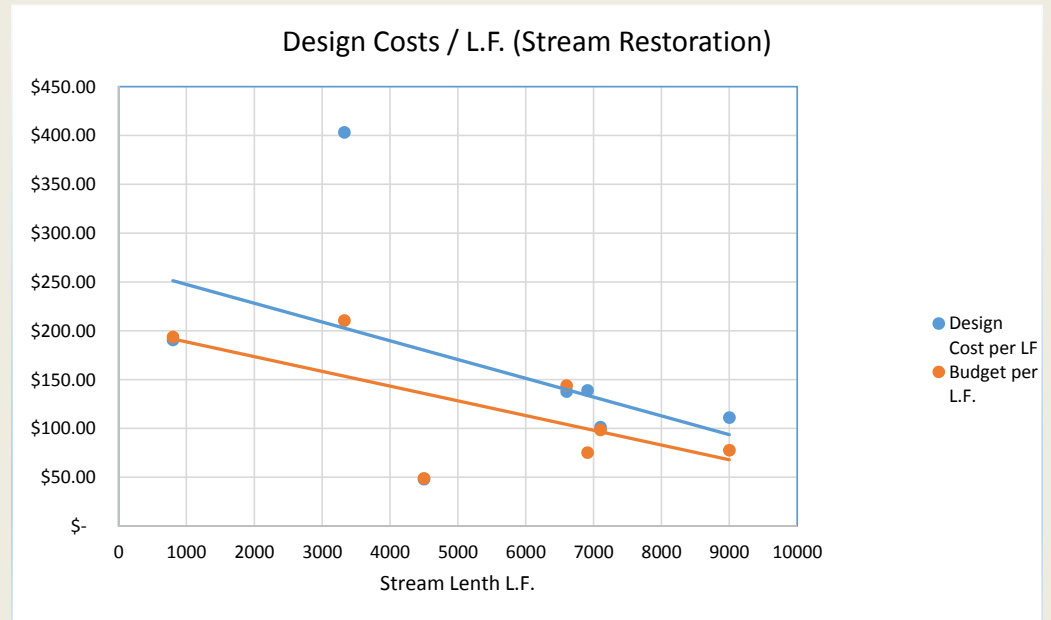
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Design Cost Per L.F. (Streams Restoration)

Eq. Acres	Design Fee	Budget	Design Cost/LF	Budget/LF
100	\$ 909,531.09	\$ 950,000.00	\$ 137.81	\$ 143.94
135	\$ 999,997.00	\$ 700,000.00	\$ 111.11	\$ 77.78
104	\$ 960,000.00	\$ 520,000.00	\$ 138.93	\$ 75.25
12	\$ 152,548.00	\$ 155,000.00	\$ 190.69	\$ 193.75
68	\$ 216,700.00	\$ 220,300.00	\$ 48.16	\$ 48.96
58	\$ 1,341,111.00	\$ 700,000.00	\$ 403.34	\$ 210.53
107	\$ 720,000.00	\$ 700,000.00	\$ 101.41	\$ 98.59
			\$ 161.63	\$ 121.26



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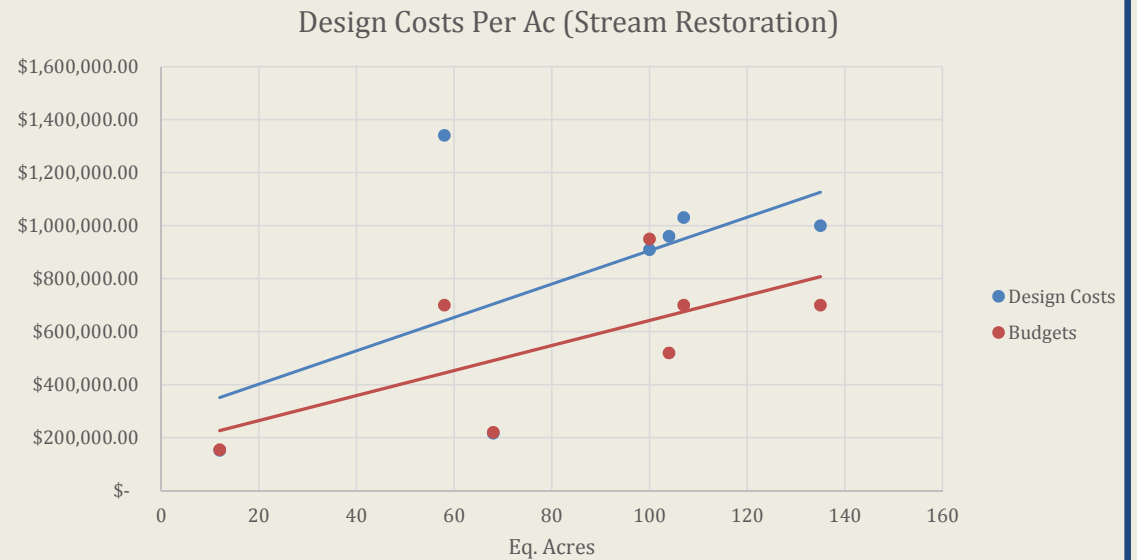
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Design Cost Per AC (Streams Restoration)

Eq. Acres	Design Fee	Budget	Cost/Acre
100	\$ 909,531.09	\$ 950,000.00	\$ 9,095.31
135	\$ 999,997.00	\$ 700,000.00	\$ 7,407.39
104	\$ 960,000.00	\$ 520,000.00	\$ 9,230.77
12	\$ 152,548.00	\$ 155,000.00	\$ 12,712.33
68	\$ 216,700.00	\$ 220,300.00	\$ 3,186.76
58	\$ 1,341,111.00	\$ 700,000.00	\$ 23,122.60
107	\$ 1,030,601.00	\$ 700,000.00	\$ 9,631.79
		Aveg	\$ 10,626.71



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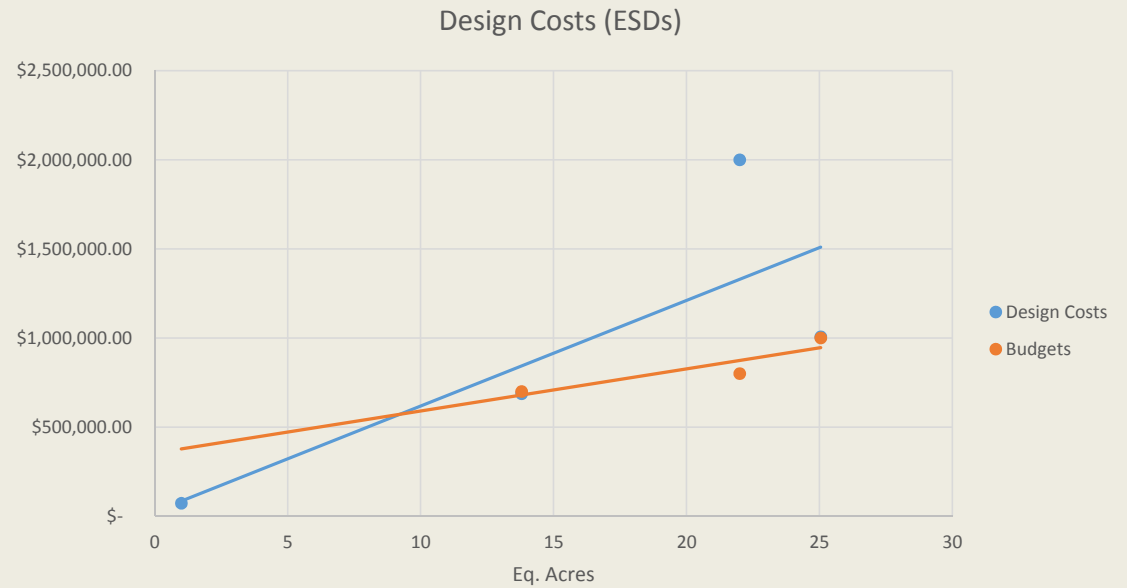
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Design Cost ESD's

Eq. Acres	Design Fee	Budget	Cost/Acre
13.8	\$ 687,528.68	\$ 700,000.00	\$ 49,820.92
25.05	\$ 1,006,500.00	\$ 1,000,000.00	\$ 40,179.64
1	\$ 73,000.00		\$ 73,000.00
22	\$ 2,000,000.00	\$ 800,000.00	\$ 90,909.09
		Aveg	\$ 63,477.41



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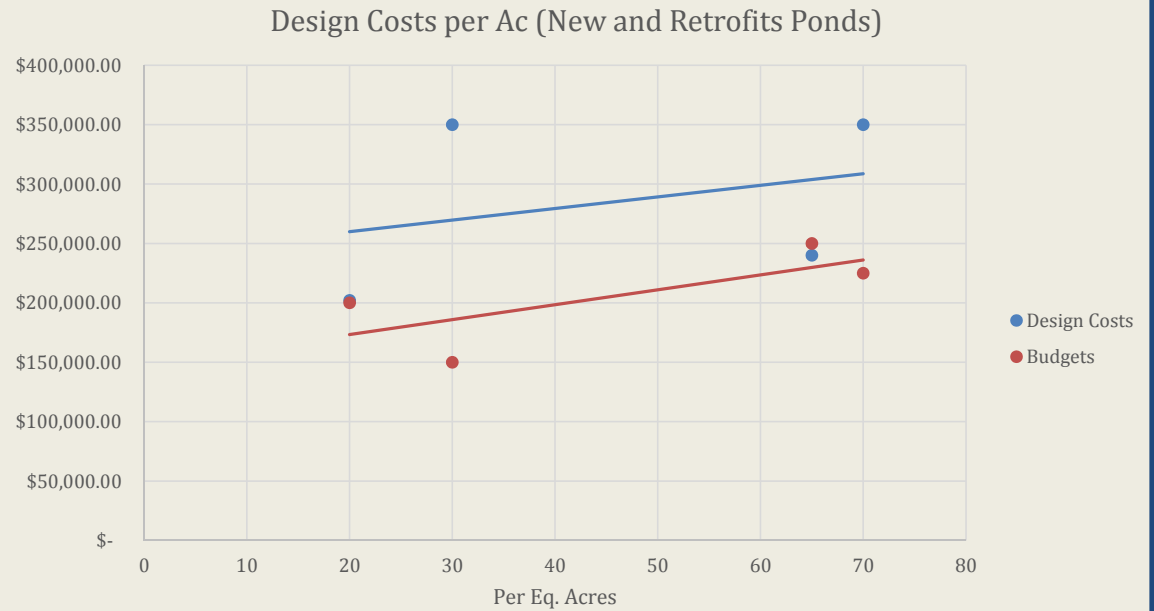
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Design Cost Ponds

Eq. Acres	Design Fee	Budget	Cost/Acre
65	\$ 240,000.00	\$ 250,000.00	\$ 3,692.31
30	\$ 350,000.00	\$ 150,000.00	\$ 11,666.67
20	\$ 202,054.00	\$ 200,000.00	\$ 10,102.70
70	\$ 350,000.00	\$ 225,000.00	\$ 5,000.00
		Aveg	\$ 7,615.42



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Looking Forward

- By meeting, or exceeding MS4 restoration requirements, the City will be on track to meet the TMDL goals.
- Restoring 20% of the City's currently untreated impervious surfaces will result in a reduction of:
 - 40,000 lbs nitrogen
 - 15,000 lbs of phosphorus
 - 2,400 tons of sediments
- Efficient, economical, and meaningful monitoring program
- Effective maintenance program



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