Life-Cycle Cost Analysis of Green Stormwater Infrastructure (GSI) in Northern Gulf Communities

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Two sites were chosen to test how small areas of green infrastructure could reduce stormwater runoff in Northern Gulf communities. Also, life-cycle costs and co-benefits of green infrastructure were conducted.

Biloxi, MS and
Orange Beach, AL

We compared the life-cycle costs and benefits of different green stormwater infrastructure (GSI). The following types of green infrastructure were considered in the analysis:

- Grassy ditch
- Rain garden
- Permeable pavement

These types of infrastructure were chosen as being practical to use on sites that have high percentages of impermeable structures/pavement.

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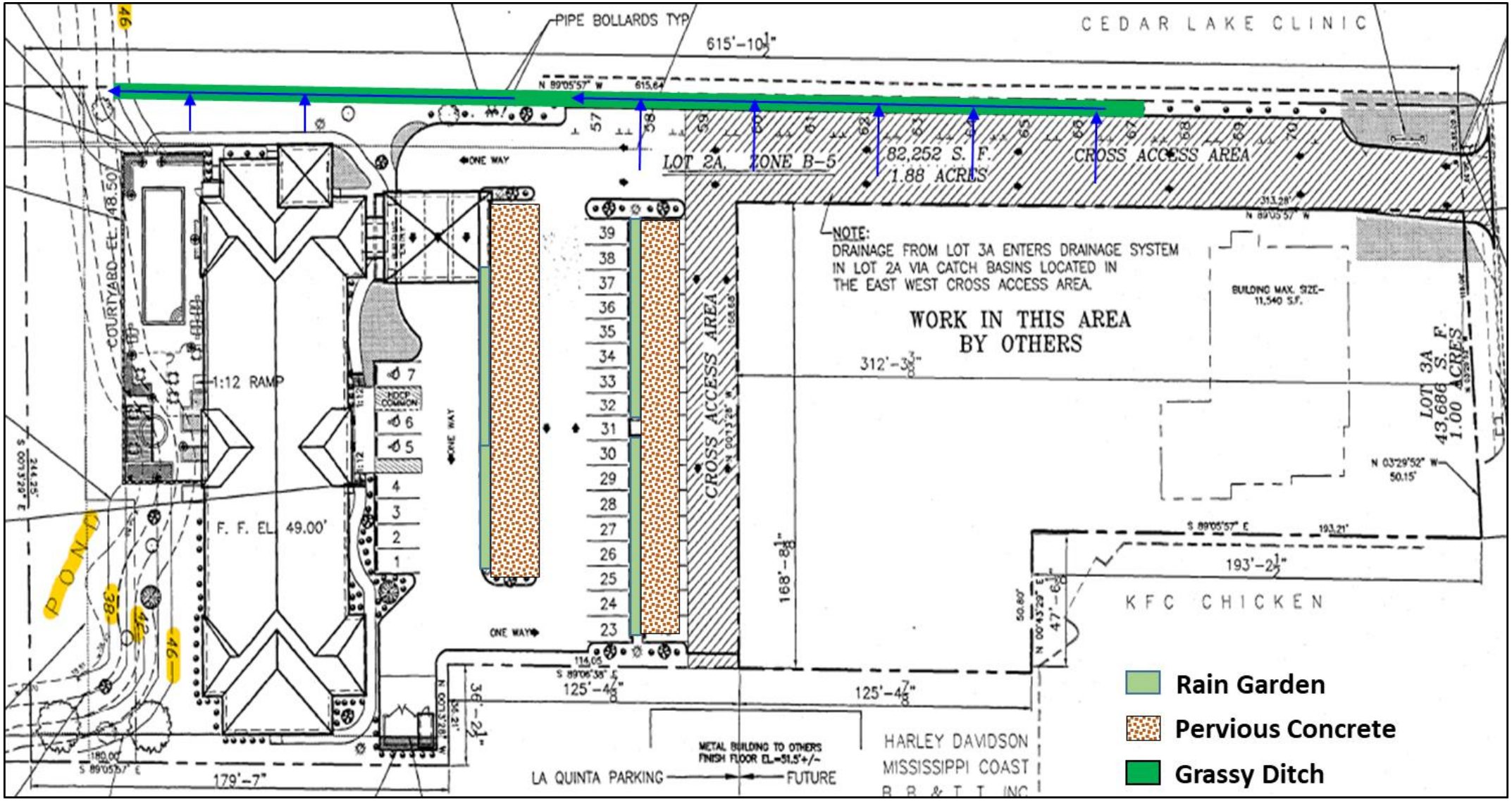
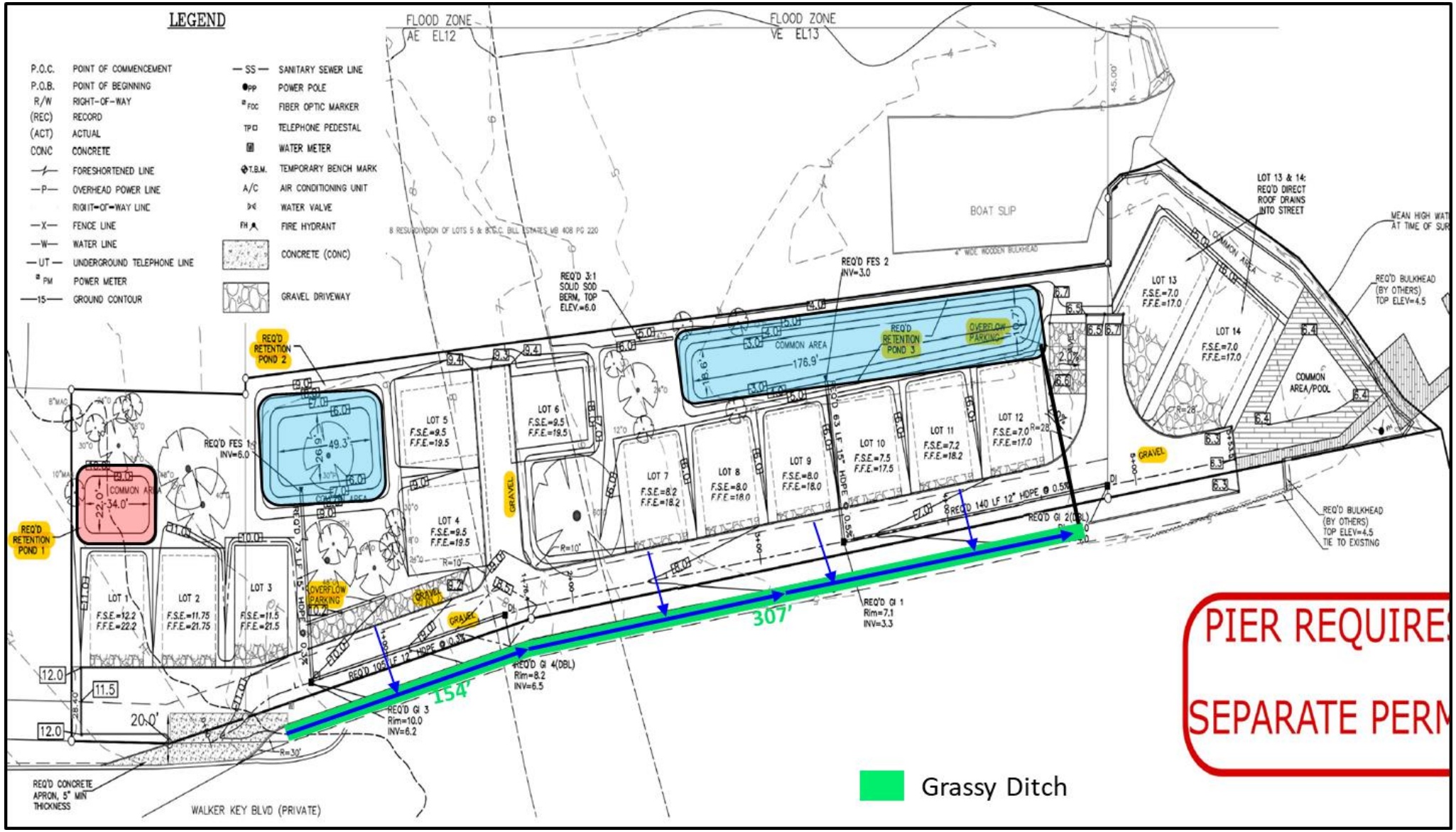
Biloxi Site: Commercial



And a residential site in Orange Beach, AL



The hydrological performance analysis results showed that the most effective/practical green infrastructure is a rain garden for the Biloxi site and grassy ditch for the Orange Beach site.

Based on the life-cycle costs, the rain garden is also the most cost-effective GSI for the Biloxi site.

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Biloxi site: life-cycle costs

Stormwater Infrastructure	Traditional Stormwater Infrastructure (Scenario 0)	Green Stormwater Infrastructure Scenarios			
		1	2	3	4
Asphalt Pavement	$39,573	$39,573	-	$39,573	-
Landscape	$32,641	$19,904	$32,641	$26,093	-
Rain Garden	-	$29,738	-	-	$29,738
Pervious Pavement	-	-	$88,652	-	$88,652
Grass Swale	-	-	-	$16,714	$16,714
Retention Pond	$36,334	$36,334	$36,334	$36,334	$36,334
Total Cost	**$108,548**	**$125,551**	**$157,627**	**$118,715**	**$171,438**
Difference (without GSI - with GSI)	-	**-$17,002**	**-$49,079**	**-$10,166**	**-$62,890**

Orange Beach site: life-cycle costs

Stormwater Infrastructure	Traditional Stormwater Infrastructure (Scenario 0)		Green Stormwater Infrastructure	
			Grass Ditch	
	Capital	O&M	Capital	O&M
Pond 1	$2,210	$6,424	$0	$0
Pond 2	$3,810	$11,075	$3,810	$11,075
Pond 3	$9,995	$29,053	$9,995	$29,053
Grassy Ditch	-	-	$3,536	$13,897
Landscaping	-	-	$2,500	$11,632
Total	**$16,015**	**$46,552**	**$19,841**	**$65,656**
Total Cost	**$62,567**		**$85,497**	
Difference (with GSI - without)	**$0**		**$22,931**	

These tables show that adding GSI on the sites increased the life-cycle costs of the sites.

However, GSI reduces stormwater runoff and has environmental health benefits.

Therefore, a co-benefit analysis was conducted.

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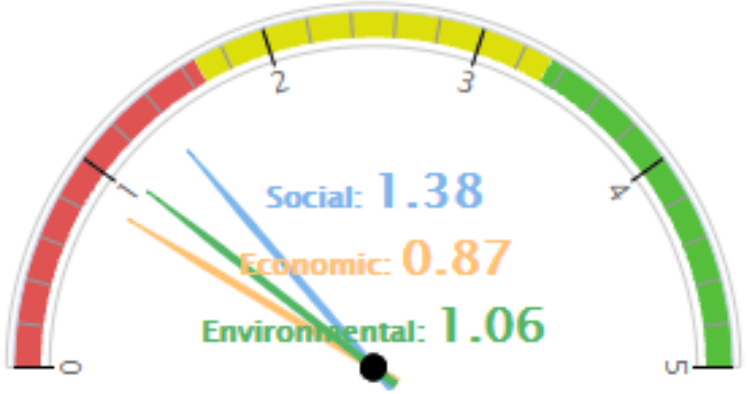
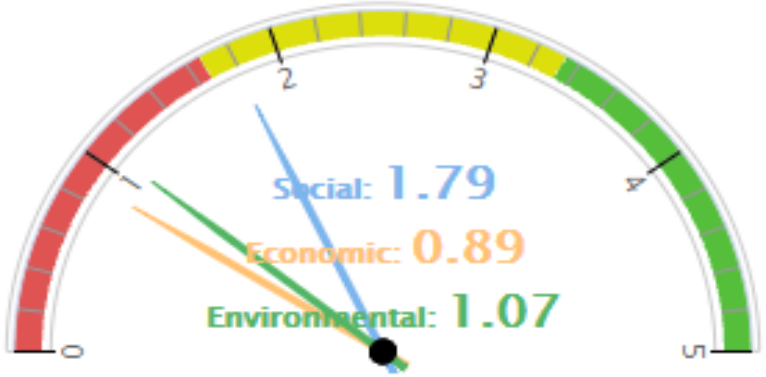
Biloxi Site: Co-benefit Analysis Results

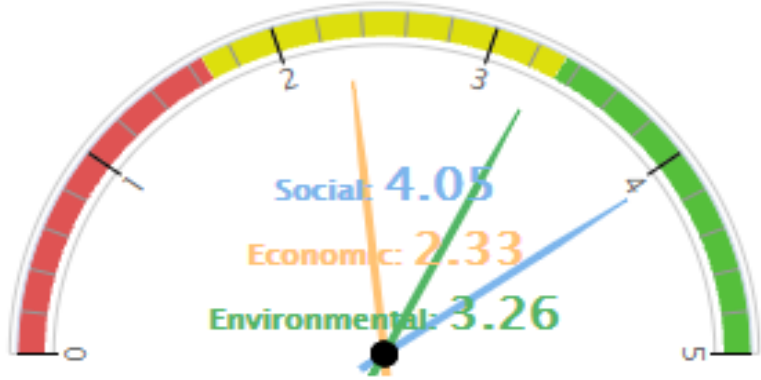
Rain garden



Pervious pavement



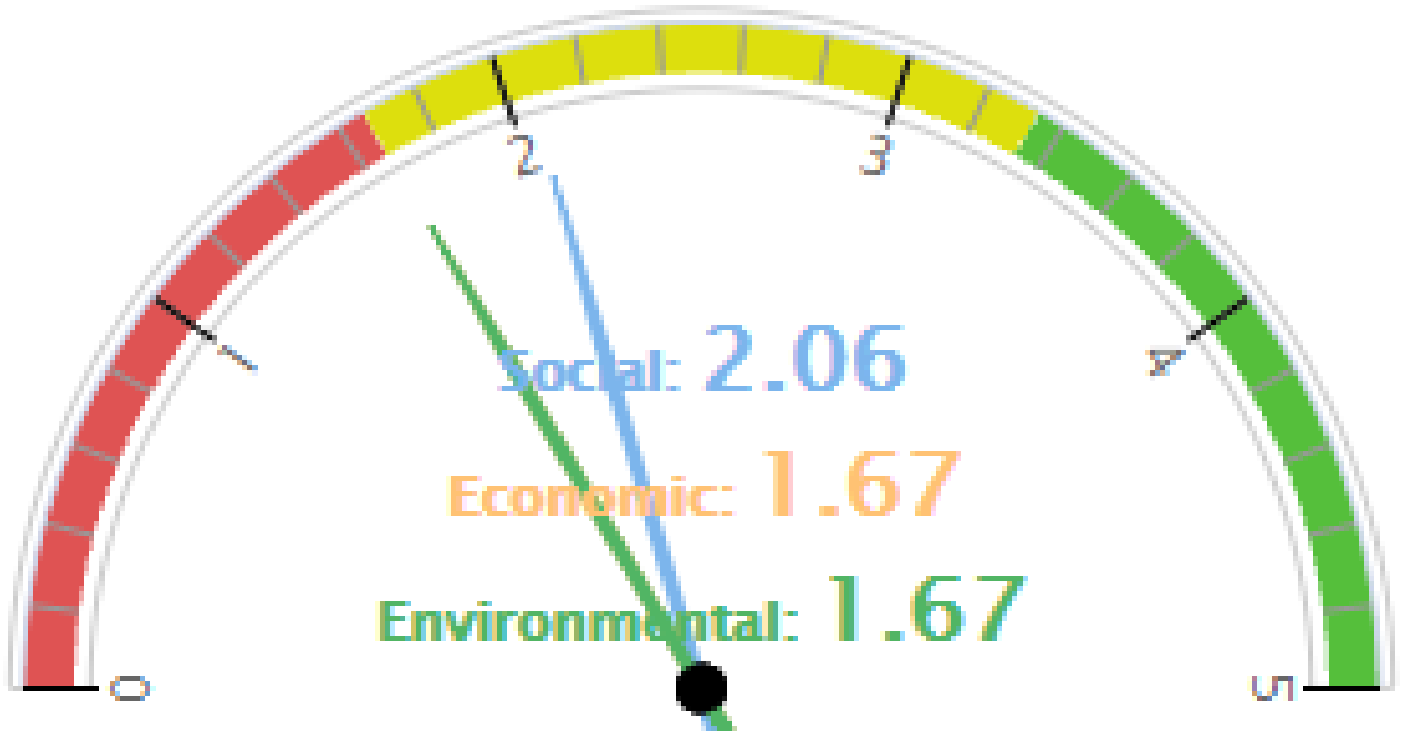
Grassy ditch



All GSI combined

Based on the Community-enabled Lifecycle Analysis of Stormwater Infrastructure Costs (CLASIC) tool

Orange Beach Site: Co-benefits of Grassy Ditch



Post-development with grassy ditch

Based on the Community-enabled Lifecycle Analysis of Stormwater Infrastructure Costs (CLASIC) tool

These figures show that all GSI types added to the sites have social, environmental, and health benefits.

The rain garden performed the best in co-benefits, life-cycle costs, and hydrologic performance.

Combining different GSIs increased the benefits score.

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Adding GSI on development sites would slightly increase the stormwater management cost. However, co-benefits of GSI may compensate for the cost increase.

In addition to reducing stormwater runoff, using effective green infrastructure offers ecological benefits that traditional infrastructure does not.

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