Final
Green Stormwater Infrastructure Feasibility Assessment for the Interstate Highways of the Turner Field Stadium Neighborhoods Livable Centers Initiative

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Executive Summary

The interstate highways adjacent to Turner Field Stadium and surrounding neighborhoods generate a significant amount of stormwater runoff contributing to the recurring flooding in downstream communities. As Turner Field Stadium and the associated parking lots are to be redeveloped, there is an opportunity for the developer to work with the Georgia Department of Transportation (GDOT) to reduce the amount of interstate runoff which flows into these neighborhoods. As part of the Turner Field Stadium Neighborhoods Livable Centers Initiative (LCI), American Rivers conducted an assessment of the potential for green stormwater infrastructure (GSI) to provide stormwater runoff reduction to both alleviate flooding downstream and provide additional quality of life benefits associated with GSI. This feasibility assessment demonstrates the feasibility of using GSI to manage the 95th percentile storm event (1.8 inches of rainfall in 24 hours, referred to as the 1.8" storm) from portions of the interstates which are bounded by the overlap of the LCI and the Custer Combined Sewer basin. The assessment concludes that with retrofits such as curb-cuts and bioretention, the 1.8" storm could be captured and infiltrated from 31.85 acres of the site, removing 1,275,243 gallons of stormwater from the combined sewer system (36% of the 3.5 million gallons generated) per event. As the LCI prepares to make recommendations for transportation improvements to GDOT, this report suggests a set of improvements that will help reduce the burden of recurring floods on downstream communities, while simultaneously improving the overall livability of the community using GSI.

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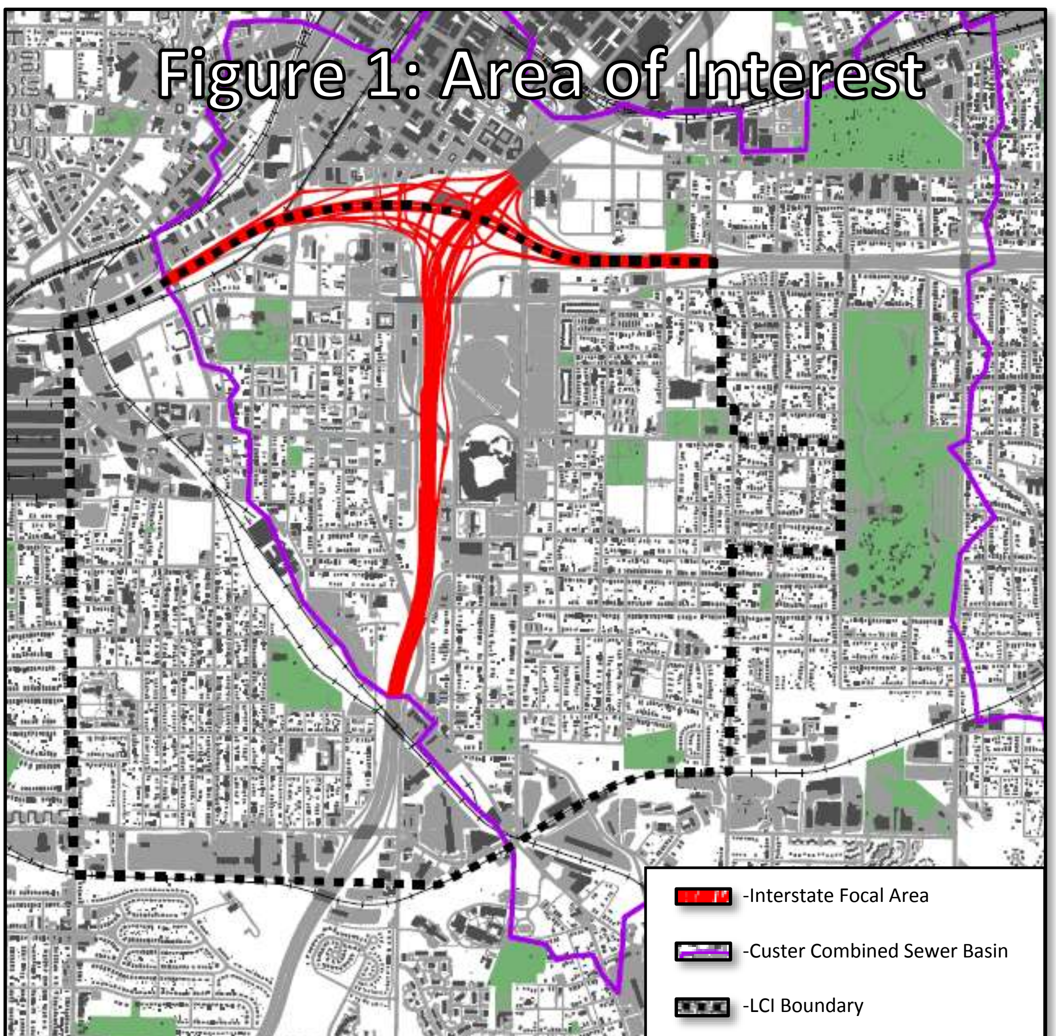
Introduction

As part of the ongoing Turner Field Stadium Neighborhoods Livable Centers Initiative (LCI), an 87.9-acre area of interstate highways was analyzed to assess its potential for green stormwater infrastructure (GSI) retrofits to reduce runoff. Through the forthcoming redevelopment of Turner Field Stadium and associated parking lots, there is an opportunity for the developer to work with the Georgia Department of Transportation (GDOT) to reduce the impact of the adjacent interstate highways on downstream flooding.

This focal area (Figure 1) is bounded by the overlap of the LCI boundary and the Custer Combined Sewer basin (the Custer sewershed) and generates a significant amount of stormwater runoff that then flows into the under-sized combined sewer system in downstream communities. This volume of run off contributes to a storm drainage system which is undersized, with combined sewer overflows occurring as recently as July 2012.[i] According to the City of Atlanta Department of Watershed Management's (DWM) estimate discussed at a public meeting on February 12, 2013, the Custer sewershed would benefit from an additional 30 to 40 million gallons of capacity to accommodate stormwater volumes. Additionally, climate change is anticipated to lead to more intense storms which will demand even greater capacity.[ii]



While there are efforts underway to create additional capacity in the system, more is still needed. According to City of Atlanta DWM Commissioner Jo Ann Macrina in a presentation on September 18, 2014 titled *Southeast Atlanta System Improvements*, the infrastructure improvements currently under construction by the City of Atlanta DWM will contribute 23.6 million gallons of new capacity. Thus, between 6.46 million and 16.46 million gallons of capacity may still be necessary to address downstream flooding. This feasibility assessment is intended to evaluate the potential for GSI to remove interstate stormwater runoff from the Custer sewershed and thereby help close the gap in necessary capacity.

The 95th Percentile Storm

The target volume for GSI was determined to be the 95th percentile storm event, which in Atlanta equates to 1.8 inches of rainfall in 24 hours (hereafter referred to as a 1.8" storm). This size storm was chosen because it would manage 95% of the storm events in an average year. The 95th percentile storm event is a common engineering benchmark as it is considered to be the level of management that replicates predevelopment hydrology,* thereby recharging aquifers and contributing to baseflow in streams during drought.

*United States Environmental Protection Agency, 2009, *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act*

This feasibility assessment details the 24 distinct areas that would be suitable for GSI retrofits to capture the 95th percentile storm event, which equates to 1.8" of rain in 24 hours (hereafter referred to as the 1.8" storm,) as seen in Figure 2. The analysis of each area includes a contributing drainage area, an associated 1.8" storm volume, an area feasible for GSI retrofit, and a minimum GSI footprint to infiltrate the design storm volume. The methods used to develop these analyses, as well as an overview of best management practices that can be utilized for retrofits, are described below. The focal area of this feasibility assessment consists of 87.9 acres of interstate, which generates 3,513,000 gallons of runoff during a 1.8" storm (Figure 1).

The Benefits of Green Stormwater Infrastructure

The retrofits proposed in this feasibility assessment demonstrate how 1,275,243 gallons of stormwater could be kept out of the combined sewer system during each 1.8" storm, but the benefits of GSI go far beyond the reduction of flooding. Studies around the country have demonstrated that GSI often brings local jobs to the area, increases property values, reduces crime and violence, provides opportunities to urban gardening and public education, lowers the urban heat island effect, reduces energy use, improves air quality, improves aesthetics, reduces noise pollution, fosters community cohesion, provides wildlife habitat, and helps communities adapt to climate change. Some forms of GSI also provide new recreational opportunities, which contribute to the overall health of the community. Additional benefits to the city include reduced cost of grey infrastructure and reduced cost of water treatment.[iii]

Green Stormwater Infrastructure

GSI is a form of wet weather management that uses vegetation, soils, natural systems, and/or engineered systems that mimic natural processes to infiltrate, evapotranspire, or recycle stormwater runoff.

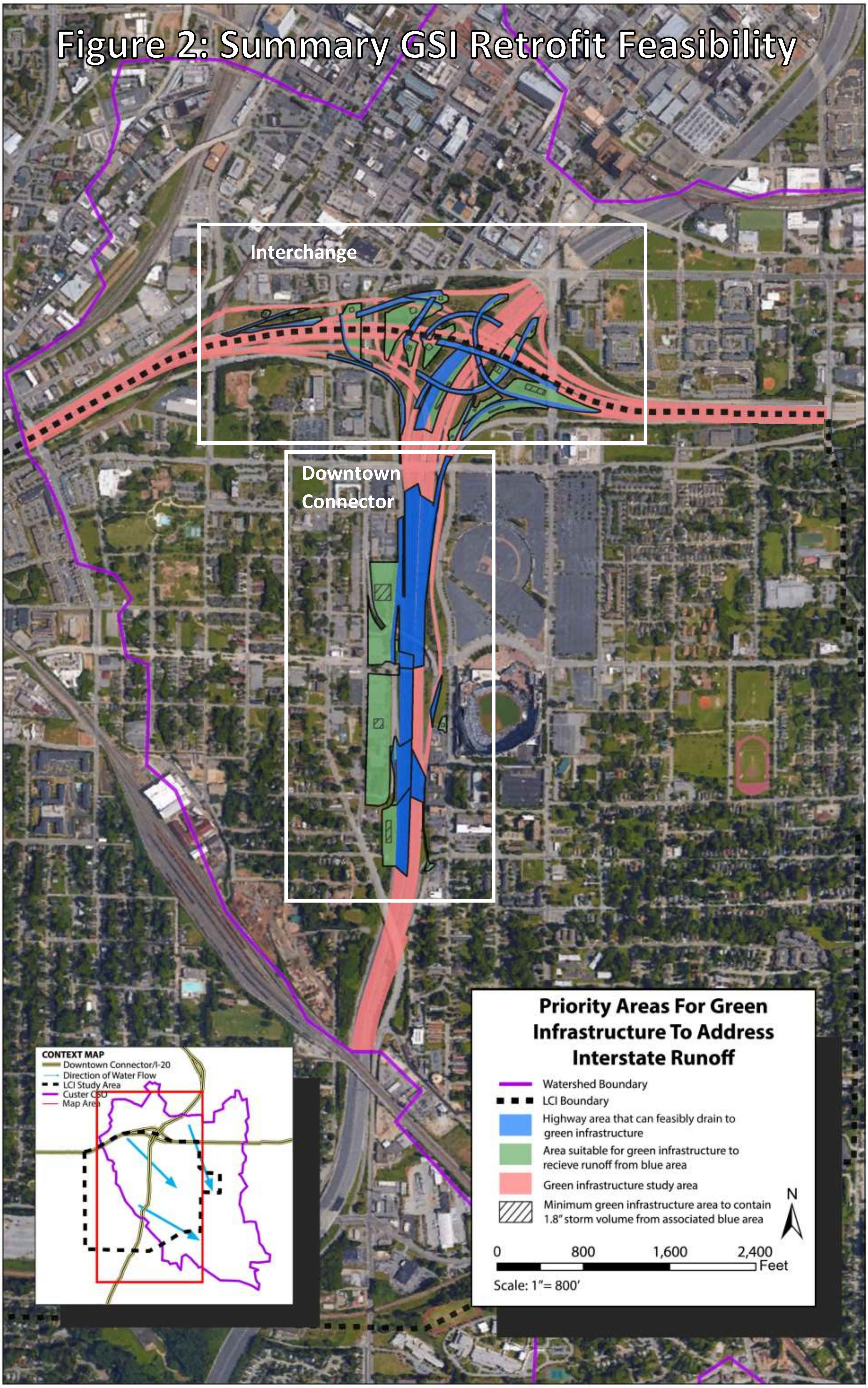


Figure 2: Summary GSI Retrofit Feasibility

Methods

This report divides the focal area for GSI retrofits into two sections: the Downtown Connector/I-20 interchange (hereafter referred to as the Interchange), and the Downtown Connector (see Figure 2). All areas were analyzed to determine the feasibility of retrofitting the areas of open space adjacent to the roadways with GSI practices which would capture and infiltrate runoff.

1. **The Interchange** is a central part of the highway system in the focal area and a major junction of impervious roadways which contains large areas of open space. The entire area is owned by the GDOT. Within the interchange, a total of 17 roadway catchments (referred to as contributing drainage areas A through Q) were found to meet the feasibility criteria for GSI retrofits.
2. The second section analyzed, the **Downtown Connector**, revealed seven additional areas (referred to as contributing drainage areas R through X) suitable for GSI implementation.
3. Portion of I-20 within the focal area were also analyzed, but no suitable areas for GSI retrofits were identified based on the criteria of the assessment.

Bioretention was identified as the optimal practice in most of the highway areas identified as suitable for GSI retrofits. In some instances, enhanced dry swales, filter strips, and bioslopes may also be appropriate. Suitable areas for GSI practices were identified by using topographic contours in ArcGIS and Google Earth. Parcels owned by GDOT or other public agencies were prioritized, although in some instances privately owned parcels have been included in the analysis if their locations were characterized by particularly desirable topography. Open spaces were prioritized based on the following criteria:

- they are lower in elevation than at least one adjacent (or nearby) stretch of road
- they contain ground that is either flat or has a gentle slope (ideally less than 5% grade)

Each area that fit those criteria was assigned a polygon layer in ArcGIS which delineated the maximum feasible boundaries for GSI practices. Next, contributing drainage areas were identified which could conceivably channel runoff to those receiving open spaces. Suitability of contributing drainage areas was determined by analysis of existing roadway topography and drain locations. The criterion here was that the roadway must need no alterations other than the elimination of existing storm drains and modifications to the curb and gutters. Each area was then evaluated based on its area, proportions, and slope to determine which specific GSI practices were best suited.

The runoff reduction volumes necessary to retain the 1.8” storm volume for each contributing drainage area were calculated in accordance with the methods specified in the Georgia Stormwater Management Manual (GSMM). The volume provided by the chosen practices was also calculated. A comparison of these two values reveals whether the minimum storage volume can be met for each contributing drainage area.

Best Management Practices

The information about the best management practices (BMPs) discussed in this section is from GDOT’s Manual on Drainage Design for Highways[iv] and the GSMM.[v] These BMPs are recommended for use throughout this report to treat interstate runoff.

Bioretention

Photo Credit: Texas DOT

Bioretention consists of mulch, various vegetation, engineered soil media, and an underdrain. Bioretention was determined to be the optimal practice to use for the majority of the permeable open spaces. Bioretention is highly versatile, can reduce the runoff volume of water by 75% of the inflow volume (with an underdrain) and is recommended by the GSMM for application along highway and roadway drainage swales. The GSMM also calls it “one of the most effective [low impact development] practices that can be used in Georgia to reduce post construction stormwater runoff and improve runoff quality.”[vi] Furthermore, GDOT indicates that bioretention has a high applicability for roadway projects, is well suited for small drainage areas with a high percentage of impervious area, has a low land requirement, and can be tailored to fit constrained sites.[vii]

Photo Credit: Georgia DOT

Bioslope

A bioslope consists of highly permeable media and an underdrain. Sheet flow from the road infiltrates into the media, is filtered, and then exits through the underdrain. According to the GSMM, bioslopes reduce the runoff volume of water by 25-50% of the inflow volume, depending on the design.

Photo Credit: Georgia DOT

Level spreader

Level spreaders promote sheet flow, with concrete troughs or similar structure to convert concentrated flow to sheet flow, so that hydraulic loading is evenly distributed in a non-erosive manner. No runoff reduction value.

Enhanced dry swale

Enhanced dry swales consist of a filter media of soil and an underdrain designed to treat runoff through infiltration and filtration. The mostly dry conditions make it a preferred option where standing water may pose a safety hazard. According to the GSMM, an enhanced dry swale with an underdrain can reduce the runoff volume by 50% of the inflow volume.

Filter strip

A filter strip filters, slows, and infiltrates sheet flow using a uniformly sloped and vegetated area. According to the GSMM, bioslopes reduce the runoff volume of water by 25-50% of the inflow volume.

Results

This assessment identified 24 sections (Areas A through X) of the interstate that are suitable for GSI retrofits that would capture and infiltrate the 1.8”storm. Rerouting of stormwater most of the areas could be accomplished with simple modifications to the roadside gutter and drain system. In all of these cases, no changes would need to be made to the surfaces of the roadways.

A majority of the areas suitable to manage stormwater are far larger than would be necessary to manage the contributing stormwater runoff. Therefore, in Figures 2-4, the area that is *feasible* to manage stormwater is represented in green. The amount of space that would be *necessary* to manage stormwater is represented with diagonal lines. The diagonal representation could be located anywhere within the area delineated in green. Parcel ownership and technical feasibility vary, but in all cases the area delineated was determined to be a reasonable suggestion based on the site constraints.

Green Stormwater Infrastructure for the Interchange (Areas A-Q)

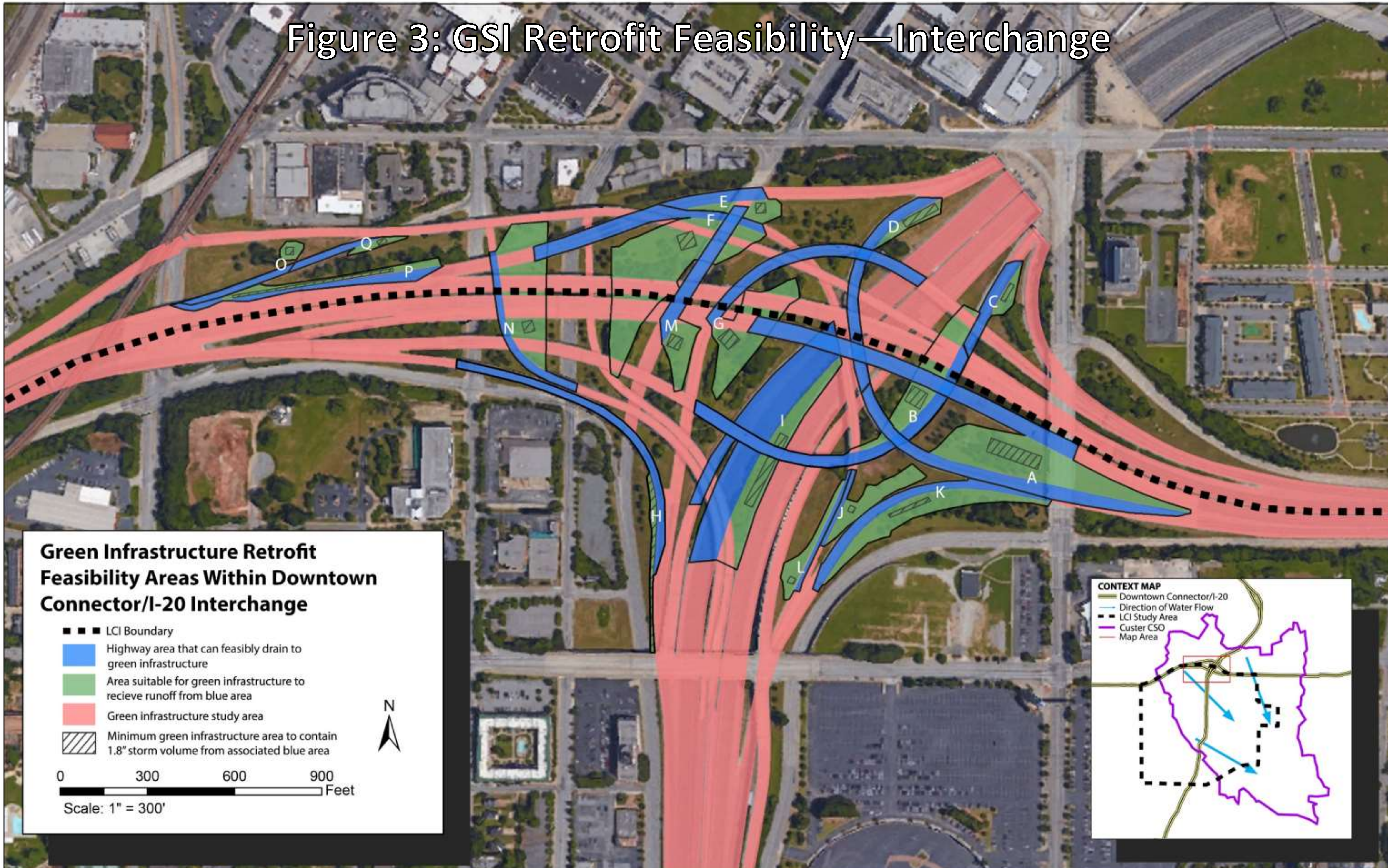
Within the Interchange, a total of 17 roadway catchments (“contributing drainage areas”) were found to be feasibility for GSI retrofits (Figure 3). These GSI practices for the segments of the Interchange have the capacity to capture and infiltrate a total volume of 500,150 gallons of runoff. The proposed retrofits would capture runoff from 12.54 acres of road surface, representing 14.27% of the total road surface area within the boundaries of the focal area. They range in size from 0.10 to 2.66 acres, with an average size of 0.74 acres. Less detail is provided for Areas A-Q than Areas R-X because the Interchange has the feasibility of managing the smaller volumes of stormwater, and tends to have fewer complications related to land ownership and engineering design.

The permeable open spaces associated with each contributing drainage area range in size from 0.10 to 2.56 acres, with an average size of 0.77 acres. The majority of the permeable open spaces have mild slopes that are both wide and long. Many of them are located at the base of a drainage area, where they receive water as channelized flows from long strips of roadway.

Of the 17 catchments within the interchange, the 1.8” storm can be managed from Areas A, B, C, E, F, G, I, J, K, L, M, N, O, and Q will a curb cut, and some form of conveyance to a bioretention basin. In some instances, there may be an opportunity to use another GDOT-prioritized BMP such as an enhanced swale or a grass channel as a pretreatment conveyance feature to bring water from the roadway into the bioretention structure. For example, roadway runoff in Area E could be routed through a roadside dry enhanced swale, sheet flow from Area L is could drain into linear roadside BMPs for conveyance, and Area K presents an opportunity for pretreatment with a filter strip.

Areas D, H, and P would require more engineering. Area D has long stretches of roadway conveying channelized flow and a slope greater than 10%, and would require a level spreader and a roadside filter strip leading to a bioslope. Alternatively, the contributing drainage area could be reduced to the strips of roadway immediately adjacent to the permeable open space so that only sheet flow from the adjacent roadway enters the filter strip. Area H has similar issues to Area D. It is possible that an enhanced dry swale or a grass channel could run parallel to the roadway on the adjacent flat ground toward a bioslope. More research would be needed to determine the feasibility here. Area P is narrow and linear, with a width of about 20 feet and a 10% grade – too steep and narrow for a filter strip or bioretention. Runoff would be in sheet flow, so the area would be suitable for a bioslope with an underdrain.

Figure 3: GSI Retrofit Feasibility—Interchange



Synopsis: Interchange

Interchange Catchments	Proposed GSI Practice	Contributing Drainage Area (Ac)	Area Feasible for GSI (Ac)	Minimum GSI Footprint (Ac/Sqft)	Ratio of Minimum Footprint to Available Area (%)	Runoff Generated in a 1.8” Storm (gallons)
Area A	Bioretention	2.66	1.84	0.20/8,776	10.9	106,227
Area B	Bioretention	1.09	1.08	0.08/3,651	7.8	43,664
Area C	Bioretention	0.32	0.16	0.02/1,045	15.4	12,708
Area D	Filter Strip to Bioslope with underdrain	0.71	0.21	0.07/3,093	34.3	28,349
Area E	Dry enhanced Swale to Bioretention	0.32	0.34	0.02/1,076	7.3	12,708
Area F	Bioretention	0.79	2.56	0.07/2,944	2.6	31,608
Area G	Bioretention	0.79	1.19	0.06/2,715	5.2	31,608
Area H	Bioslope with underdrain	0.70	0.21	0.21/9,008	100.0	27,993
Area I	Bioretention	2.5	1.12	0.19/8,146	16.6	100,036
Area J	Bioretention	0.1	0.49	0.01/400	1.9	3,910
Area K	Bioretention	0.66	0.96	0.05/2,262	5.4	26,394
Area L	Bioretention	0.14	0.16	0.01/472	7.0	5,539
Area M	Bioretention	0.57	0.39	0.04/1,880	11.1	22,810
Area N	Bioretention	0.37	1.56	0.03/1,439	2.1	14,663
Area O	Bioretention	0.21	0.10	0.02/685	15.6	8,472
Area P	Bioslope with underdrain	0.42	0.38	0.13/5,601	34.1	16,944
Area Q	Bioretention	0.16	0.10	0.01/527	11.6	6,517
Total	--	12.54	12.85	1.23/53,720	9.6	500,150

Green Stormwater Infrastructure for the Downtown Connector (Areas R-X)

Seven areas were identified as suitable for GSI implementation along the Downtown Connector to the south of the Interchange (Figure 4). Each is discussed individually below. These GSI practices for the segments of the Downtown Connector have the capacity to capture and infiltrate a total volume of 775,093 gallons of runoff. The proposed retrofits would capture runoff from 19.31 acres of road surface, representing 21.97% of the total road surface area within the boundaries of this focal area. Areas S and V would require more engineering than the other areas identified, but were included in this assessment due to their feasibility to manage a large amount to stormwater. Greater detail is provided for Areas R-X because the Downtown Connector section has the feasibility of managing the larger volumes of stormwater, and tends to have more complications related to land ownership and engineering design.

Area R

Area R is 0.18 acres of permeable open space which is available to be converted to GSI. It would capture runoff from 0.39 acres of interstate—a volume of 15,640 gallons in a 1.8” storm. This would entail eliminating the existing drains for the contributing drainage area and cutting channels or leaving a gap in the concrete barrier, similar to how California Department of Transportation has adapted their barriers for wildlife.[viii] Water could pour off the highway and drop about 15 feet into the receiving area at street level. Creating such a pour-over from a curb cut into bioretention would be a unique design solution, but possible, and not unprecedented. A similar situation occurs at Old Fourth Ward Park, where runoff exits a level spreader and drops vertically into the receiving basin.

Area S

Currently a large parking lot, a 4.57 acre area, has great potential to be converted into a space for stormwater management. Most of the parcels (totaling 3.18 acres) in this area are owned by GDOT. GIS data indicates that the area contains seven parcels that are privately owned. The ownership of nearly one acre within this area is unclear based on available GIS data.

The presence of Pulliam Street poses an obstacle because it is a topographic low point that separates the highway from the proposed GSI area. A solution would need to be designed to convey water from the interstate to the permeable open space, likely by piping it over or under Pulliam Street. If it were piped under the road, the water would then need to be piped upward to its outlet in the GSI BMP. This may be more feasible if removal of the parking lot enables some excavation and lowering of the grade in some areas of the site, thus reducing the level of head on the pipe.

Alternately, channeling the water over the street presents an opportunity to design an attractive, visible structure over the road that highlights the stormwater function of the open space. It could serve as a landmark and a way to draw attention to GSI-based stormwater management.

This site presents 4.57 acres of possible GSI area which could drain around 6.48 acres of adjacent southbound roadway and a portion of Pulliam Street. If the corresponding northbound side could be incorporated as well, then the contributing drainage area would be expanded to 10.86 acres. These contributing drainage areas would generate 259,052 gallons of stormwater and 434,359 gallons, respectively, in a 1.8” storm. However, it is important to note that these drainage areas are only estimates. Because of the need to use pipes to convey water over or under Pulliam Street rather than relying on overland catchment methods, the extent to which the highway’s stormwater could be rerouted depends on the elevation of various points along the existing pipe infrastructure. A more detailed analysis of this area is warranted to determine feasibility and preferred solutions. The site is also ideally situated to capture water from Mechanicsville, to the west. Because the amount of area available for GSI BMPs greatly exceeds the area necessary to infiltrate runoff from the highway alone, accommodating additional runoff from Mechanicsville would enhance the functionality of the space.

Area T

Area T is a grassy area that lies directly adjacent to the highway and has the potential to be one of the largest and simplest GSI retrofits. Because of its large area of available permeable space relative to its contributing drainage area from the highway, GSI here could easily be designed to handle volumes well in excess of a 1.8” storm. GDOT owns 1.11 acres, and 0.46 acres are owned by privately, totaling 1.57 acres of suitable permeable open space, which could be redesigned as a filter strip and bioretention area to receive stormwater from 1.94 acres of adjacent southbound interstate lanes. This contributing drainage area would generate 77,553 gallons of stormwater in a 1.8” storm.

Furthermore, it is possible that the northbound lanes could also drain to this area; they are topographically positioned to do so, but water would have to be conveyed across the southbound lanes.

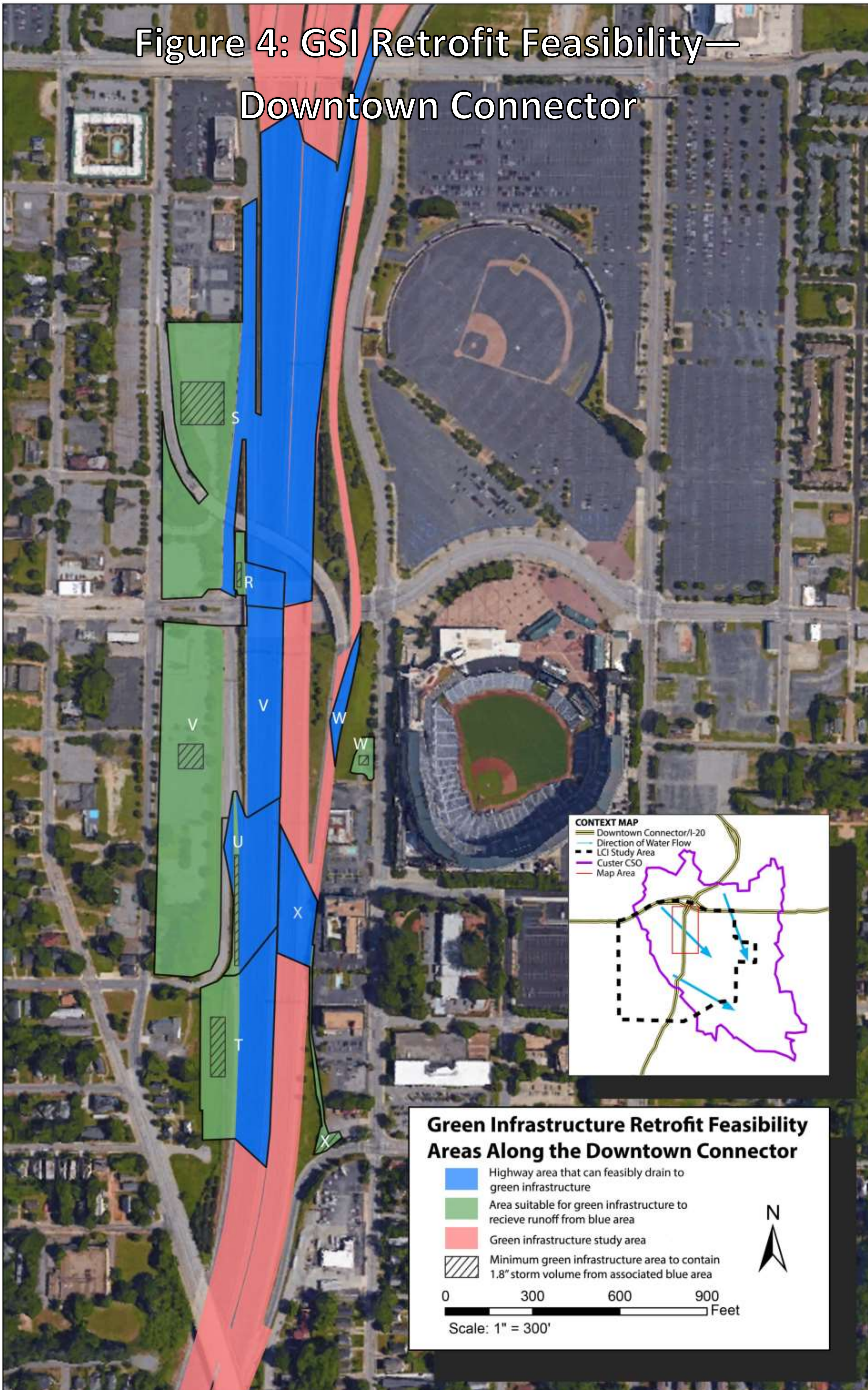


Figure 4: GSI Retrofit Feasibility—Downtown Connector

If these lanes were incorporated into the contributing drainage area, it would comprise a total of 3.12 acres, contributing 124,724 gallons of stormwater in a 1.8" storm.

All of this proposed contributing drainage area sheet-flows toward the open space, but is intercepted by a gutter and storm drains at the edge of the roadway. Conveyance of stormwater to the GSI could be achieved by a simple retrofit: modifying the gutter and eliminating the storm drains.

Because of its low-lying topography, opportunities exist to use this area to capture runoff from parts of Mechanicsville to the west of the site. Also worth noting, the combined sewer and stormwater pipe that drains the majority of the top of the Custer sewershed passes under this site before crossing under the highway. This makes this area potentially suitable for an underground in-line gray infrastructure practice, such as another stormwater vault that could complement the infiltration-based GSI practice on the surface.

Area U

An existing green strip in a median that separates Dodd Avenue from a southbound highway on-ramp could be converted to an infiltration-based GSI practice—either an enhanced swale or bioretention. Analysis of existing topography indicates that the median strip would receive a small amount of runoff from Dodd Avenue, but much more from the interstate and the on-ramp. 0.27 acres are available to be converted to GSI. It could capture runoff from 1.65 acres of interstate—a volume of 65,882 gallons in a 1.8" storm. This land is all currently owned by GDOT.

Area V

Analysis of existing topography indicates that parcels in Area V would be suitable for receiving stormwater from a nearby portion of the interstate. However, the presence of Dodd Avenue poses an obstacle here in the same way that Pulliam Street does in Area S. It is a topographic low point that separates the highway from the proposed receiving areas. Water from the interstate would need to be piped to the receiving GSI areas, over or under Dodd Avenue. If high-density development were to go in this area, it would still be possible to treat the runoff with bioretention due to the small amount of land that would be required (0.17 acres). If the parcels here were redeveloped as greenspace, then it is possible that Dodd Avenue could be removed (effectively linking Areas S, U, and V). However, the presence of an existing highway on-ramp that branches off from Dodd Avenue just south of its intersection with Ralph David Abernathy Boulevard would need to be reconciled. The contributing drainage area for Area V is the portion of interstate just north of the on-ramp, so the on-ramp would continue to be an obstacle unless it were moved along with Dodd Avenue. Further study is needed to determine the technical feasibility of these scenarios.

Initial analysis indicates that Area V could receive runoff from a 2-acre contributing drainage area representing a volume of 80,811 gallons generated during a 1.8" storm. Like Area S, overland catchment and conveyance methods will not work for this contributing drainage area. The existing drain and pipe system must be utilized instead, which means that the exact boundaries of highway surface area which could function as the contributing drainage area depend on the configuration of its existing pipe infrastructure. It is possible that runoff from the northbound lanes adjacent to the contributing drainage area could be incorporated. This area has been identified by Park Pride as a proposed location for the "Mechanicsville Greenspace" [ix], but the participants from the LCI workshops preferred high-density development to go into this area. Parcels in this area are largely owned by the City of Atlanta or Atlanta Fulton County Recreation Authority. Regardless of the eventual capacity for this space to receive highway runoff, it is ideally positioned to connect Areas S, T, U, and V. The entire combined area is subject to flooding as identified by DWM's flood model,[x] (Appendix 1) which may create a design challenge if the flood waters deposit a significant amount of sediment or debris into the BMPs.

Area W

A portion of the northbound interstate access road immediately adjacent to Turner Field Stadium could undergo a retrofit to be drained via a swale into a bioretention area in Area W. The greatest challenge is that the roadway and the proposed GSI space are separated by a 1:2 slope with 38 feet in elevation change. However, it is still technically feasible to design a swale or some other conveyance structure to reach the bioretention area. 0.20 acres are available to be converted to GSI. They would capture runoff from 0.30 acres of interstate—a volume of 11,731 gallons in a 1.8" storm. This land is currently owned by GDOT.

Area X

Runoff from a 0.98-acre portion of northbound interstate just south of Turner Field Stadium could be diverted into a swale leading to a 0.12-acre bioretention area. This would be an arrangement similar to Area W. However, the distance from the contributing drainage area to the bioretention basin would be substantially longer (approximately 575 feet). The grade between the contributing drainage area and the GSI catchment is much milder, with an average grade of around 2.5%. This makes it suitable to design the conveyance structure itself as an infiltration-based GSI practice. Ideally, this would be an enhanced dry swale. Overall, the 0.98-acre contributing drainage area, contributing 39,102 gallons of runoff in a 1.8" storm, would drain into a total of 0.24 acres of infiltration-based GSI. Sizing calculations indicate that the combined swale and bioretention are just large enough to infiltrate the 1.8" storm volume from the contributing drainage area. A local homeowner at an LCI workshop proposed that the Ormond Street highway off-ramp could be eliminated. If this were to happen, the space that it currently occupies could provide additional capacity for GSI. The land is all currently owned by GDOT.

Synopsis: Downtown Connector

Interstate Highway Catchments	Proposed GSI Practice	Contributing Drainage Area (Ac)	Area Feasible for GSI (Ac)	Minimum GSI Footprint (Ac/sqft)	Ratio of Minimum Footprint to Available Area (%)	Runoff Generated in a 1.8" Rain Event (gallons)
Area R	Bioretention	0.39	0.18	0.03/1,272	16.2	18,544
Area S	Bioretention	10.86	4.57	0.81/35,336	17.7	434,359
Area T	Bioretention	3.12	1.57	0.23/10,195	14.7	124,724
Area U	Bioretention	1.65	0.27	0.12/5,298	44.4	65,822
Area V	Bioretention	2.02	5.94	0.17/7,425	2.9	80,811
Area W	Bioretention	0.29	0.19	0.02/955	10.5	11,731
Area X	Bioretention	0.98	0.24	0.07/3,150	29.2	39,102
Total	--	19.31	12.96	1.45/63,631	11.2	775,093

Conclusion

This feasibility assessment evaluates 24 areas suitable for GSI retrofits to reduce stormwater runoff volumes delivered to combined sewers within the area bounded by the LCI and the Custer sewershed. Bioretention was identified as the optimal practice in most of areas, and in some instances enhanced dry swales, filter strips and bioslopes were also considered. In nearly every case, the land which is feasible for GSI retrofit is much larger than the minimum area required to infiltrate the target volume. Altogether, these 24 areas would capture and infiltrate runoff from 31.85 acres of road surface, or 36.2% of the 87.9-acre focal area. During a 1.8” storm, these areas would divert 1,275,243 gallons of runoff from the combined sewer system.

Given that the LCI is largely focused on transportation improvements, and that it may be making recommendations to GDOT to alter portions of the interstate highway sections in the focal area, this assessment is intended to provide a timely set of recommendations that may help reduce the burden of recurring floods on downstream communities.

This assessment demonstrates the feasibility of GSI retrofits to reduce stormwater runoff from the highways into the combined sewer system and thereby reduce contributions to an already stressed system. Given that several neighborhoods within the focal area have a history of periodic flooding and combined sewer overflows, a currently under-sized combined sewer system, and a proposed new development that will demand more sewer capacity in the system, it would be prudent to seek out cost-effective opportunities to reduce stormwater runoff into the system.

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[i] Department of Watershed Management, 2016, Southeast Atlanta Green Infrastructure Initiative. http://www.atlantawatershed.org/projects/southeast-atlanta-green-infrastructure/

[ii] Carter, L., et al., 2014, Ch. 17: Southeast and the Caribbean. *Climate Change Impacts in the United States: The Third National Climate Assessment*, http://nca2014.globalchange.gov/report/regions/southeast

[iii] Center for Neighborhood Technology and American Rivers, 2010. *The Value of Green Infrastructure: A Guide to Recognizing Its Economic, Environmental and Social Benefits*. http://www.cnt.org/sites/default/files/publications/CNT_Value-of-Green-Infrastructure.pdf

[iv] Georgia Department of Transportation, 2016. *Manual on Drainage Design for Highways. Revised: September 2016*, http://www.dot.ga.gov/PartnerSmart/DesignManuals/Drainage/Drainage%20Manual.pdf

[v] Atlanta Regional Commission, 2016, *Georgia Stormwater Management Manual, Volume 2: Technical Handbook*, http://atlantaregional.com/environment/georgia-stormwater-manual

[vi] ibid

[vii] ibid

[viii] California Department of Transportation, 2006. *Keeping It Simple: Easy Ways to Help Wildlife Along Roads*. http://www.fhwa.dot.gov/environment/wildlife_protection/index.cfm?fuseaction=home.viewArticle&articleID=111

[ix] Park Pride, 2015. *Parks of Summerhill Executive Summary*.

[x] Department of Watershed Management, 2013. Southeast Atlanta Green Infrastructure Initiative Reason for Permeable Pavers. City of Atlanta.

Appendix 1: Southeast Atlanta Flood Model