Rethinking *Runoff*

BRUNSWICK, GA

GREEN INFRASTRUCTURE PLAN

ACKNOWLEDGEMENTS

This work is intended to provide a feasibility assessment of potential stormwater green infrastructure opportunities within the City of Brunswick, Georgia. This planning document has been prepared by the University of Georgia Marine Extension and Georgia Sea Grant and Goodwyn Mills Cawood, LLC, for the City of Brunswick. Financial assistance was provided by the Coastal Management Program of the Department of Natural Resources. City of Brunswick staff were instrumental in informing and refining this document.

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Introduction

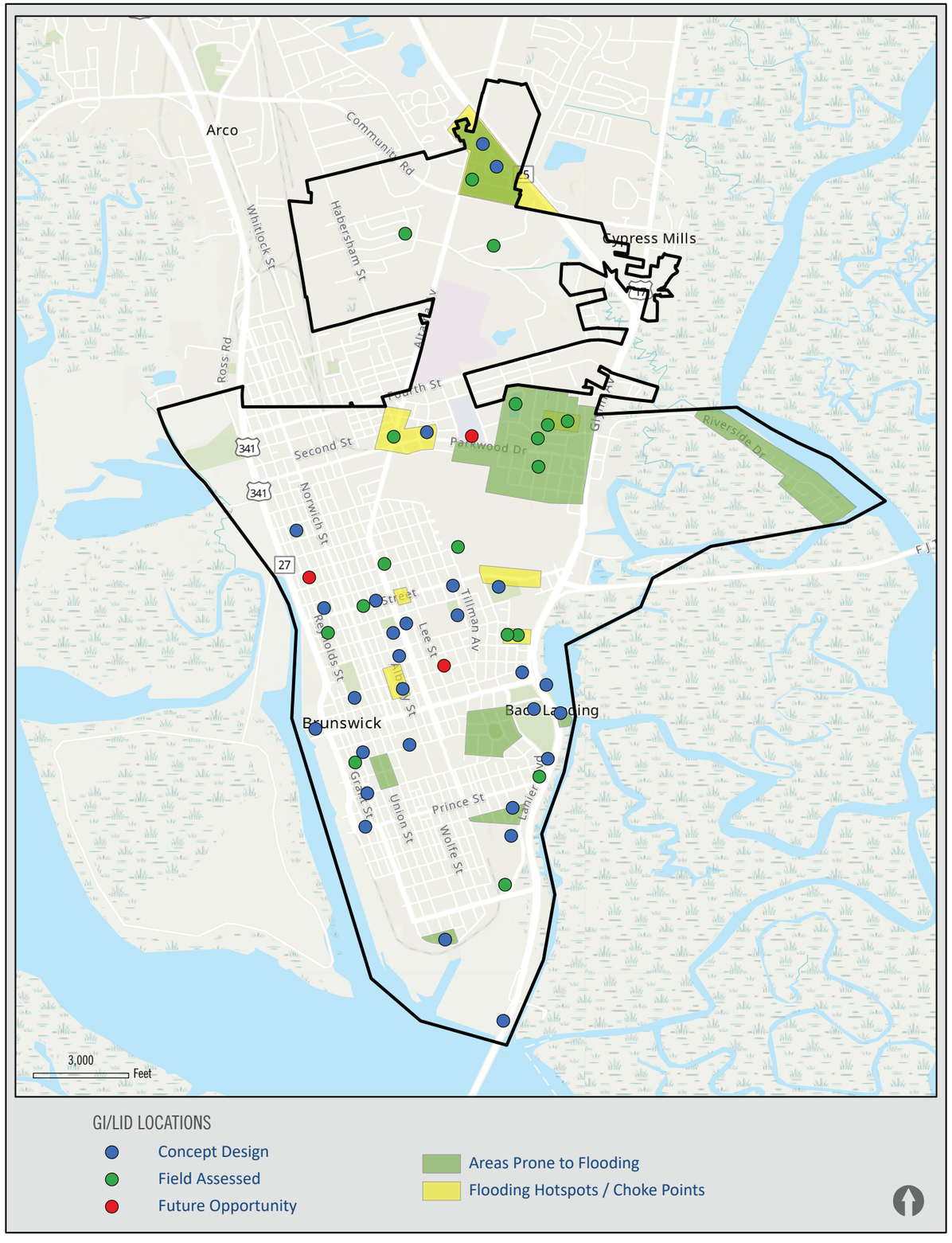
PROJECT OVERVIEW

In October 2020, the City of Brunswick and its partners received a Coastal Incentive Grant from Georgia Department of Natural Resources (DNR), Coastal Resources Division to develop a Rethinking Runoff Plan that identifies "shovel-ready" green infrastructure stormwater projects positioned for implementation. This plan is meant to highlight green infrastructure opportunities and be a resource for decision makers. The primary goal of this work was to create a tailored plan that assessed the feasibility and site applicability of different stormwater green infrastructure practices using geospatial data, local knowledge, and expertise of Project Team personnel.

This project, in tandem with other stormwater management efforts, will empower the City of Brunswick to educate, change policy, and take actions toward improved stormwater management and climate resiliency. This plan positions the City of Brunswick to continue proactively planning for stormwater management in their site design process, provides conceptual designs to garner community support, and supplies fundamental information for future implementation of green infrastructure strategies. This document outlines green infrastructure opportunities; however, the city of Brunswick is not committed to their implementation as part of the Rethinking Runoff Plan. Further engineering design and funding resources are necessary for implementation.

CITY OF BRUNSWICK

The City of Brunswick is a small coastal community and the county seat of Glynn County, Georgia, supporting an estimated population of 15,210 (U.S. Census Bureau, 2020). According to the U.S. Census Bureau, the City has a total area of 25.3 square miles, broken into 17.1 square miles of land and 8.2 square miles of water. Brunswick is located 69 miles southwest of Savannah in the Satilla River Basin. Brunswick is located in the Lower Coastal Plain subregion of Georgia, and all of the receiving water bodies are tidally-influenced. By evaluating the city's feasibility for green infrastructure, there are cost-effective ways to begin mitigating for flooding and water quality concerns to continue to protect the City of Brunswick's connection to the surrounding water resources and to assist in achieving their mission of providing the highest quality of life, nurturing a strong business community, and maintaining efficient government for the residents of Brunswick.



WHAT IS STORMWATER?

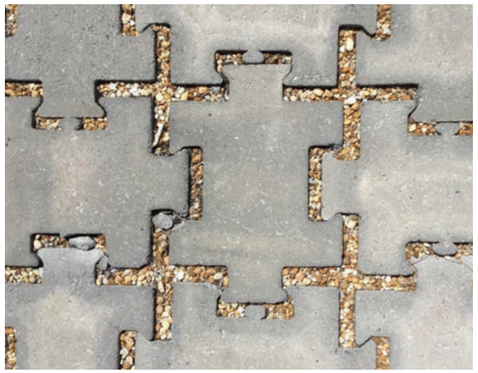
When rainfall flows across a surface instead of being absorbed into the ground, it is called “stormwater” or “stormwater runoff.” With the addition of roads, parking lots and buildings, the land surface becomes impervious. Impervious surfaces result in a disproportionate amount of rainfall becoming stormwater runoff and it leads to flooding, erosion and reduced water quality. Green infrastructure stormwater practices can be a solution to restore the natural function of a developed landscape.

WHAT IS GREEN INFRASTRUCTURE?

Green Infrastructure is a form of low impact development, which promotes the use of natural systems to manage stormwater runoff close to its source. Green infrastructure low impact development (GI/LID) approaches to stormwater management protect, restore, and mimic the natural water cycle by capturing, filtering and treating stormwater runoff before it negatively impacts local waterways. Green infrastructure uses vegetation, soils, permeable surfaces, and rainwater harvesting to manage stormwater. It is a cost-effective, resilient approach to managing wet weather impacts that provides many community benefits.

Green infrastructure strategies

There are hundreds of different measures and strategies ranging from site to watershed scale applications that are classified as green infrastructure strategies or practices. This plan focuses on three primary strategies: bioretention systems, permeable pavement, and rainwater harvesting (cisterns). These are all practices recognized by the Coastal Stormwater Supplement to the Georgia Stormwater Management Manual as suitable for stormwater management in the coastal region.



Project Site Identification

COMMUNITY ENGAGEMENT

For the City of Brunswick to gain the support necessary to implement stormwater green infrastructure, its residents must first understand the role that this type of sustainable infrastructure can play in improving the quality of their water resources and protecting them from the effects of flooding. The project sites selected were chosen based on their feasibility to support green infrastructure to manage stormwater, public accessibility, and educational opportunity. Furthermore, feedback from partners during stakeholder meetings included the group's desire to prioritize project locations in public or City-owned properties. The Rethinking Runoff Plan is not meant to be an exhaustive list of green infrastructure practices for the City of Brunswick, but rather, a tool to show examples and identify higher priority sites to address flooding hotspots. The green infrastructure projects included in the plan span across all Brunswick neighborhoods.

SITE SELECTION AND FIELD ASSESSMENTS

A list of priority sites for green infrastructure implementation was identified and selected for field assessment following a series of municipal engagement meetings and various community outreach events. The finalized list of priority sites focused on city-owned and publicly-accessible properties, along with heavily-used locations such as schools, community/civic buildings, and faith-based organizations' properties.

Projects that have high impact for both stormwater management and education were given priority. A variety of project scales were selected, but all projects focus on managing stormwater at the site-scale. In total, 52 sites were originally identified and 49 of those locations were selected for field assessment. The Rethinking Runoff Plan includes 28 locations where green infrastructure can be established. Utilizing the web application from the developed GIS Map, each site was assessed and photographed. Field assessments predominately took place during Summer 2021; however, multiple site visits were required for most locations.

SOIL SUITABILITY

A desktop analysis was conducted to determine suitability of soils for infiltration and green infrastructure practices. Based on the USDA-NRCS Web Soil Survey, the most common soil series, at approximately 61%, is "Bohicket-Capers Association (BO)." "BO" is mostly undeveloped (and open-space) tidal marsh and marine deposits that have a hydrologic soil group (HSG) rating of "D" and depth to water table of 0 inches. A HSG of "D" has the lowest potential for infiltration. The second-most common soil series, at approximately 28%, is Mandarin-Urban land complex (Mb). "Mb" has an HSG of "C", meaning slow potential infiltration rates, but it has a deeper water table of 1.5-3.5 feet. This is followed by Mandarin fine sand (Ma) at 7% of the land area. "Ma" has an HSG of "A", meaning it has the highest potential for infiltration, and the general depth to water table ranges from 1.5-2.5 feet. In general, "Ma" is present in the northern section of the City limits, north of 4th Street, and "Mb" is present in the developed parcels located in the middle and southern sections of the City. The remaining four soil series comprise less than 4% total, and all are described in *Table 1.*

TABLE 1
SOIL SERIES PRESENT WITHIN CITY LIMITS

SOIL SERIES NAME	ABBREV.	LAND AREA (%)	GENERAL LOCATION
Bohicket-Capers Association	BO	61	Marshland, perimeter of city
Cainhoy fine sand	CaB	<0.1	Small area northeast of Golden Isles Parkway/Hwy 17
Mandarin fine sand	Ma	7	Majority of developed land north of 4th Street
Mandarin-Urban land complex	Mb	28	Majority of developed land south of 4th Street
Pelham loamy sand	Pe	<2	Primarily in College Park neighborhood, Glynn Isles Mall, and Glynn Middle School.
Pottsburg Sand	Po	<0.1	Small area in College Park neighborhood.
Rutledge fine sand	Ru	<2	Small areas in northern third of city.

The soil series were rated based on water table depth (WTD) and HSG. The ratings for WTD were based on the following criteria:

- "Poor" for a depth less than 1.5 feet
- "Fair" for a depth between 1.6 and 3.5 feet
- "Good" for a depth between 3.6 and 6.0 feet
- "Excellent" for a depth greater than 6.0 feet

The ratings for HSG were based on the following criteria:

- "Poor" for a HSG of "D" and "/D"
- "Fair" for a HSG of "C"
- "Good" for an HSG of "B"
- "Excellent for an HSG of "A"

If either WTD or HSG were classified as "Poor," the corresponding GI/LID suitability was "Low/None." If both WTD and HSG were classified as "Good" or "Excellent," the corresponding GI/LID suitability was "High." Lastly, "Moderate" GI/LID suitability was assigned for any soil series that had ratings of "Fair" and greater. Based on the desktop analysis, approximately 35% of the land area has "Moderate" suitability for GI/LID practices. This includes primarily "Ma" (7%) and "Mb" (28%). While both have a "Moderate" GI/LID suitability rating, this was due to a "Fair" WTD rating. "Ma" is more likely to have faster infiltration rates than "Mb" due to a HSG of "A" versus "C." Approximately 65% of the land area had "Low/None" GI/LID suitability. This includes approximately 61% classified as "BO" and approximately 4% of the land classified as Rutledge fine sand (Ru) and Pelham loamy sand (Pe). "Ru" and "Pe" have HSG ratings of "B/D" and "A/D," meaning that depth to the water table for these is less than 12 inches. The individual WTD and HSG characteristics and associated ratings for each soil series are presented in *Table 2.*

TABLE 2
GI/LID SUITABILITY

Abbrev.	HSG	Rating (HSG)	WTD	Rating (WTD)	GI/LID Suitability	LAND AREA (%)
BO	D	Poor	0"	Poor	Low/None	61
CaB	A	Excellent	>80"	Excellent	High	<0.1
Ma	A	Excellent	18"-30"	Fair	Moderate	7
Mb	C	Fair	18"-42"	Fair	Moderate	28
Pe	B/D	Poor	0"-12"	Poor	Low/None	<2
Po	A	Excellent	24"-42"	Fair	Moderate	<0.1
Ru	A/D	Poor	0"-6"	Poor	Low/None	<2

Three sites are located in Pelham loamy sand (Pe) and three located in Bohicket-Capers Association (BO). These six sites have a GI/LID soil suitability of "Low/None." These sites will require additional investigation and more detailed analysis before green infrastructure can be fully considered. Additionally, 22 other sites are located in Mandarin-Urban land complex (Mb). These locations had "moderate" GI/LID soil suitability due to hydrologic soil group 'C' and depth to water table, 18-42 inches. Soil auger testing was conducted at two of these sites (Mb soils, moderate suitability). At one site, the actual water table depth was 78 to 90 inches deep and the infiltration rate at 60 inches deep was 1.3 inches per hour. The other site had a water table depth greater than 72 inches, and when an infiltration test was attempted a constant head of water could not occur due to rapid infiltration rates. These are much better soils than expected from the NRCS Soil Survey generalization, so it is possible that actual performance of GI/LID in these areas will be better than originally anticipated from the desktop analysis using the NRCS soil survey. Additional soil borings at each site are recommended to confirm water table depth and soil texture near the bottom of the GI/LID practice.

Planning and Design

CALCULATIONS / ASSUMPTIONS

The GI/LID practices were sized and placed based on exploring the flow pathways of stormwater runoff and amount generated from uphill drainage areas. Placement targeted areas that could capture the most stormwater runoff, and many were proposed immediately uphill of an existing stormwater inlet. Drainage areas were delineated using: 1-foot contour data from the Glynn County GIS Department, stormwater infrastructure data from the City, and field assessments. Because impervious surfaces generate the most stormwater runoff and a primary objective is to disconnect impervious surfaces, the practices were sized and annual runoff reduction was calculated based on total impervious area. A couple sites had gravel or compacted soil driveways within the drainage areas, and these were treated as impervious for the calculations. The calculations for annual runoff reduction were based on runoff generated from the impervious surface plus direct rainfall on the GI/LID practice. Based on local, average rainfall data, it was assumed that there is 50 inches of rain per year. From stormwater research studies, it was assumed that 90% of rainfall on impervious surfaces on an annual basis was transformed to runoff.

The GI/LID practices were sized based on guidance in the Georgia Stormwater Management Manual, and general sizing and design approaches were as follows:

- Due to high cost of bioretention media and propensity for shallow water tables, the media depth was never larger than 2 feet. Some practices with lower surface elevations were further reduced to 1.5 feet.
- A gravel layer was used in all bioretention systems to promote infiltration across the entire bottom area. The depth was 6 inches when there was not an underdrain and 9 inches when present.
- Bioretention systems receive the highest removal efficiencies when there is not an underdrain, so this was recommended in about half of the cases. Many of these were because there was no access to existing stormwater infrastructure or not sufficient elevation change to daylight an underdrain.
    - A recommendation for future work is to explore actual soil conditions and water table depths using a hand auger to confirm prior to initiating full survey and design.
- When an underdrain was proposed, the internal water storage (IWS) configuration was used because it provides more treatment than conventionally drained systems, as well as a smaller footprint and subsequent cost. If later soil testing indicates sufficient infiltration rates and water table depths, it is recommended to exclude the underdrain to either capture and treat more runoff or reduce the size of the practice (and overall cost).
- In bioretention systems that do not have an underdrain and when they were near schools or houses, a shallower average ponding depths were proposed (6 to 9 inches). The Georgia Stormwater Management Manual says the maximum ponding depth for bioretention is 12 inches but based on depths of infiltration basins in Coastal Georgia, it may be worth exploring deeper ponding depths to capture larger rainfall events or to slightly reduce the footprint and overall project cost. These cases will more than likely need an underdrain to help dewater the surface ponding zone within 24 hours.
- Permeable pavement retrofits were primarily located in parking stalls, and the permeable pavement area was often larger than the impervious surface drainage area because this would reduce the sediment load and subsequent maintenance demand. The ratio of impervious area to permeable pavement area never exceeded 3:1, which is the Georgia Stormwater Management Manual guidance, except one site that had a hydraulic loading ration of 4.3:1. For this site, the impervious area was entirely roof runoff; therefore, it is expected to have a low sediment load.

PRELIMINARY COSTS

Preliminary cost estimates were calculated based on the surface area, depth/length of materials, and other factors based on percentage of total cost. The total prices per project area were similar to recent bid tabulations for GI/LID practices in Coastal Georgia. A few techniques to further save on construction costs include:

- If soil testing indicates deep, sandy soils, look to remove underdrain and deepen surface ponding depth, as this will reduce the footprint and quantities of materials needed.
- Spoil excavated soil on site or find an alternate use nearby.
- If existing soils are sandy and fall within the ranges presented in the Georgia Stormwater Management Manual, look to reuse soil for bioretention construction.
- Simplify planting scheme.
- Construct/install in-house when possible.

College Park *(Neighborhood Park)*

4817 Malabar Drive

DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
13,000 sq.ft	**0 sq. ft.**	**BIORETENTION**	**1,000 sq. ft.**	**1,330 cu. ft.**	**52,900 cu. ft.**	**0.40 MGAL**	**75%**	**0.30 MGAL / YR**	**$37,000**

OVERVIEW

Two bioretention systems are proposed adjacent to the fitness court at the park to capture, treat, and infiltrate stormwater. Any overflow from the bioretention systems will be discharged to the drainage ditch at the southern end of the park. Educational signage can be used to help parkgoers understand the use of this green infrastructure.

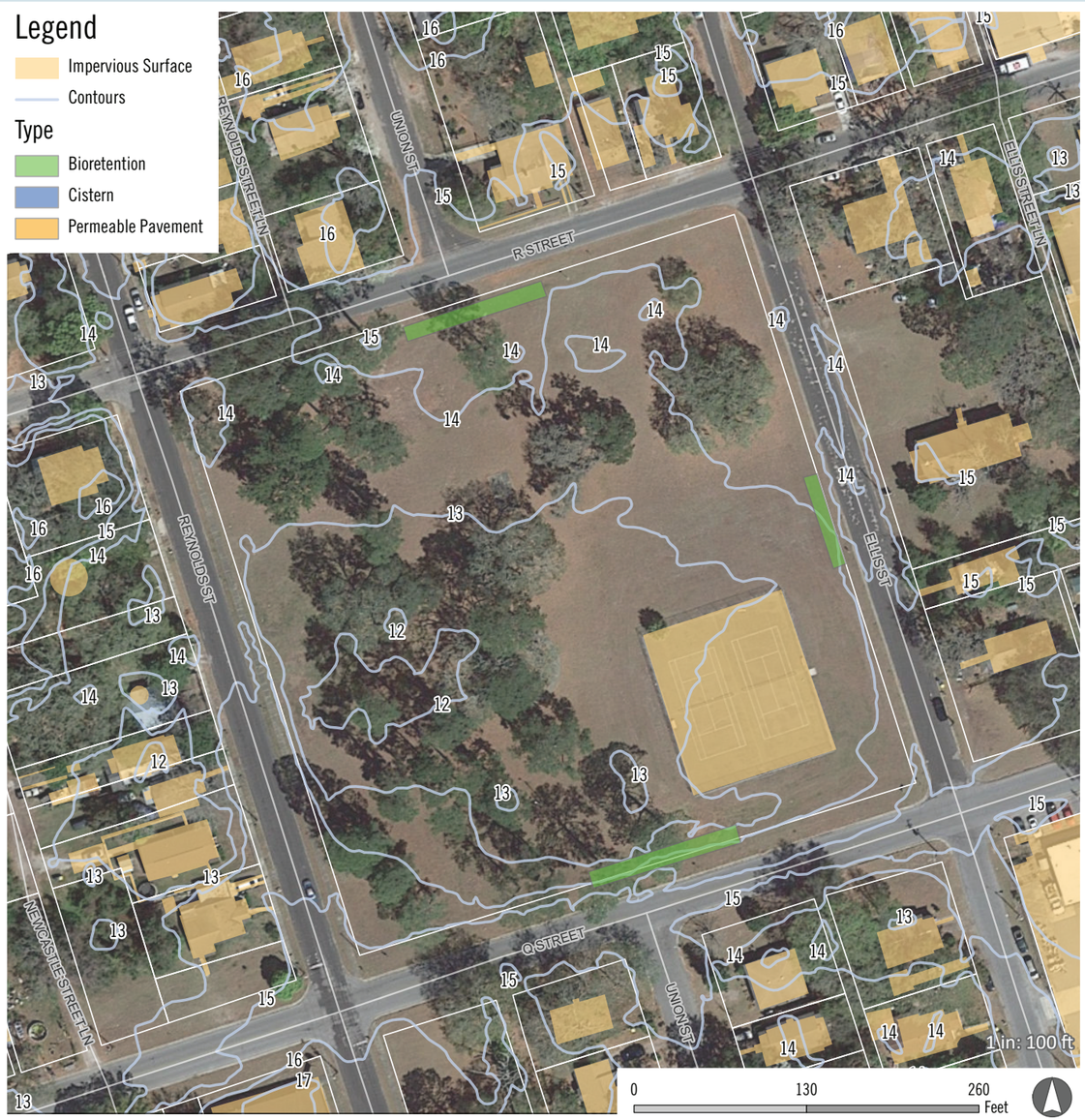
DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
8,500 sq.ft	9,650 sq. ft.	PERMEABLE PAVEMENT	9,650 sq. ft.	1,740 cu. ft.	72,100 cu. ft.	0.54 MGAL	100%	0.54 MGAL / YR	$237,000
15,750 sq.ft	0 sq. ft.	BIORETENTION	1,400 sq. ft.	1,630 cu. ft.	64,900 cu. ft.	0.49 MGAL	100%	0.49 MGAL / YR	$49,500

Goodyear Park

2209 Parkwood Drive

OVERVIEW

Permeable pavement is proposed on the eastern and western edges of Goodyear Park to provide designated parking to handle planned park upgrades. Stormwater runoff from the streets can be routed to this system. The permeable pavement will infiltrate stormwater runoff and reduce current erosion. A linear bioretention system is proposed to capture, filter, and infiltrate stormwater runoff from the tennis and fitness courts, planned pavilion, as well as compacted areas. Additionally, the northwest corner green space should be prioritized for preservation. Educational signage is proposed for the planned pavilion.



DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
52,000 sq.ft	**0 sq. ft.**	**BIORETENTION**	**3,550 sq. ft.**	**5,280 cu. ft.**	**209,800 cu. ft.**	**1.57 MGAL**	**75% / 100%**	**1.40 MGAL / YR**	**$127,500**

Palmetto Square Park

2718 Reynolds Street

OVERVIEW

Bioretention systems are proposed along the streets adjacent to Palmetto Park to intercept, treat and infiltrate stormwater runoff. Existing storm sewer inlets can be modified to route stormwater to these bioretention systems. The existing, low-lying green space on the western side of the park functions as natural green infrastructure and should be prioritized for preservation. Educational signage can be used throughout to help parkgoers understand the use of this green infrastructure.

Orange Square Park

2216 Reynolds Street

DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
90,000 sq.ft	**0 sq. ft.**	**NATURAL BIORETENTION**	**6,000 sq. ft.**	**9,120 cu. ft.**	**362,500 cu. ft.**	**2.71 MGAL**	**100%**	**2.71 MGAL / YR**	**$89,000**

OVERVIEW

Increased utilization of natural green infrastructure at the low-lying elevations in the northwest corner of Orange Square Park is recommended. Stormwater from inlets at the intersection of M and Reynolds Streets can be routed into a bioretention system to capture, filter, and infiltrate stormwater. Consider constructing this system through soil amendments to minimize root disturbance. Educational signage can be used within the park to help parkgoers understand the use of this green infrastructure.

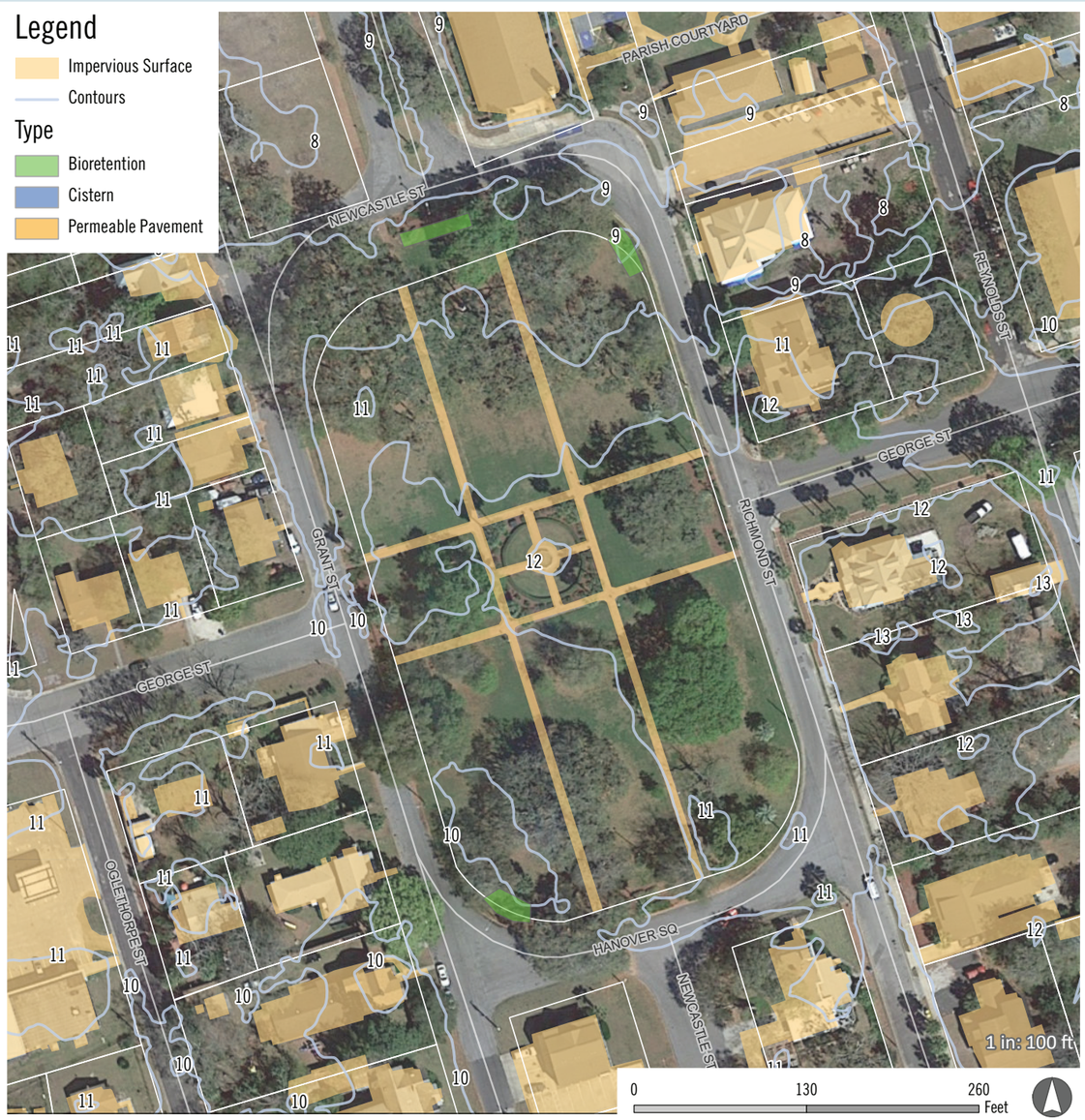
Mary Ross Park

101 Gloucester Street

DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
43,000 sq.ft	**0 sq. ft.**	**BIORETENTION**	**3,800 sq. ft.**	**4,440 cu. ft.**	**177,100 cu. ft.**	**1.32 MGAL**	**75%**	**0.99 MGAL / YR**	**$142,000**

OVERVIEW

Bioretention systems are proposed in targeted runoff areas to disconnect and intercept stormwater. The two bioretention systems proposed on the perimeter of Mary Ross Park will reroute stormwater from streets and sidewalks via existing storm sewer inlets to be captured, treated, and infiltrated. Existing educational signage can be amended to help park visitors understand the use of this green infrastructure.



Hanover Park

1100 Grant Street

DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
24,000 sq.ft	**0 sq. ft.**	**BIORETENTION**	**1,600 sq. ft.**	**2,430 cu. ft.**	**96,700 cu. ft.**	**0.72 MGAL**	**100%**	**0.72 MGAL / YR**	**$53,000**

OVERVIEW

Stormwater runoff from the adjacent streets can be routed into bioretention systems along the perimeter of Hanover Square. Placement of the bioretention systems is uphill of existing storm sewer inlets on the northern end and in a low-lying area on the southwest corner to intercept stormwater runoff from roadways and allow it to be captured and infiltrated. Educational signage to explain the use and benefit of bioretention is proposed.

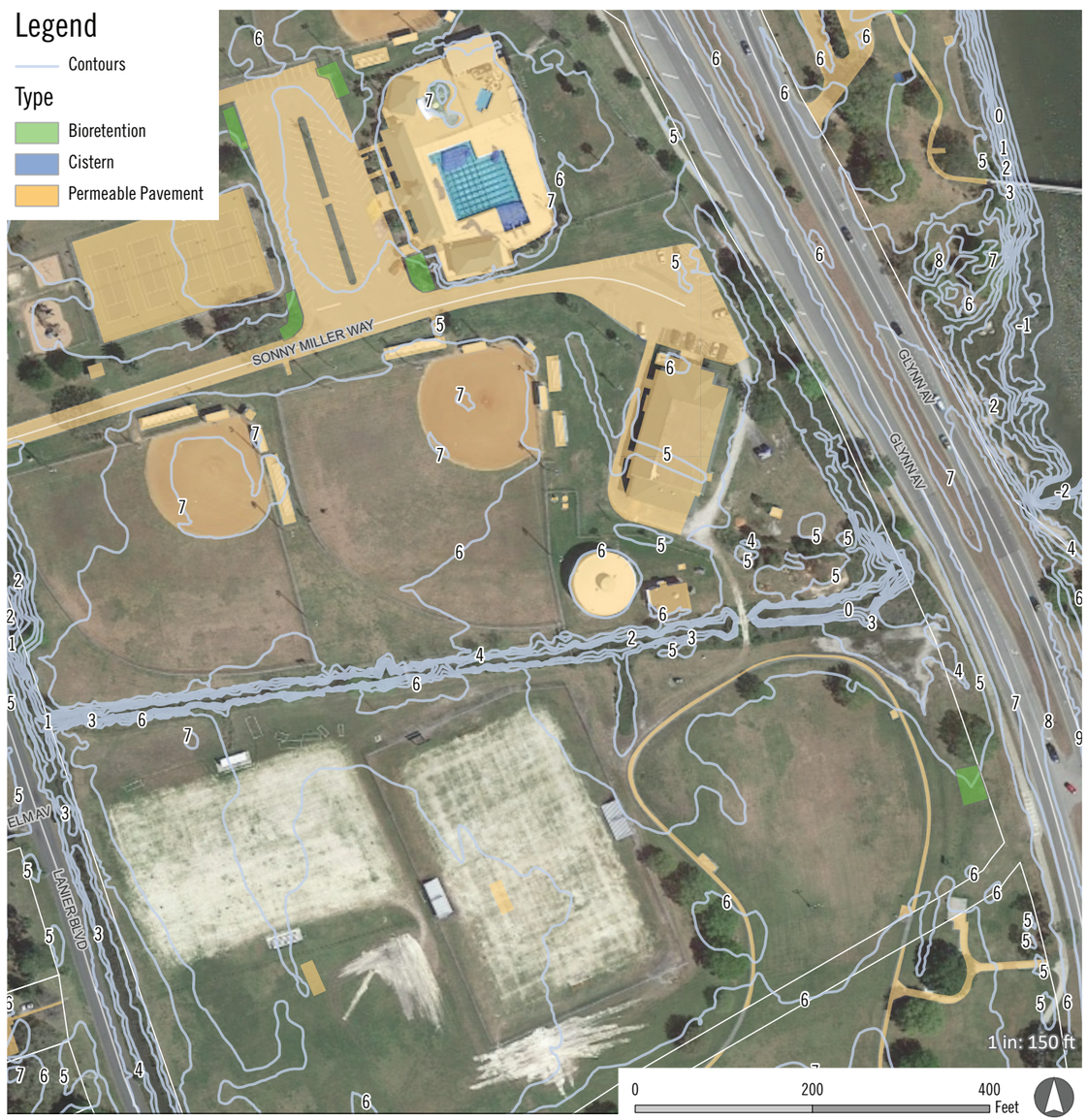
Marshes of Glynn Overlook Park

1420 Glynn Avenue

DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
25,000 sq.ft	**0 sq. ft.**	**BIORETENTION**	**2,250 sq. ft.**	**2,590 cu. ft.**	**103,100 cu. ft.**	**0.77 MGAL**	**100%**	**0.77 MGAL / YR**	**$65,000**

OVERVIEW

Bioretention system retrofits to existing swales within the park are proposed to capture, filter, and infiltrate stormwater. These bioretention systems will accept stormwater runoff from parking lots, picnic pavilions, sidewalks and other impervious surfaces within the park. Additionally, these systems will provide a buffer and reduce erosion before stormwater enters the marsh. Educational signage will be used to help park visitors understand the use of this green infrastructure.



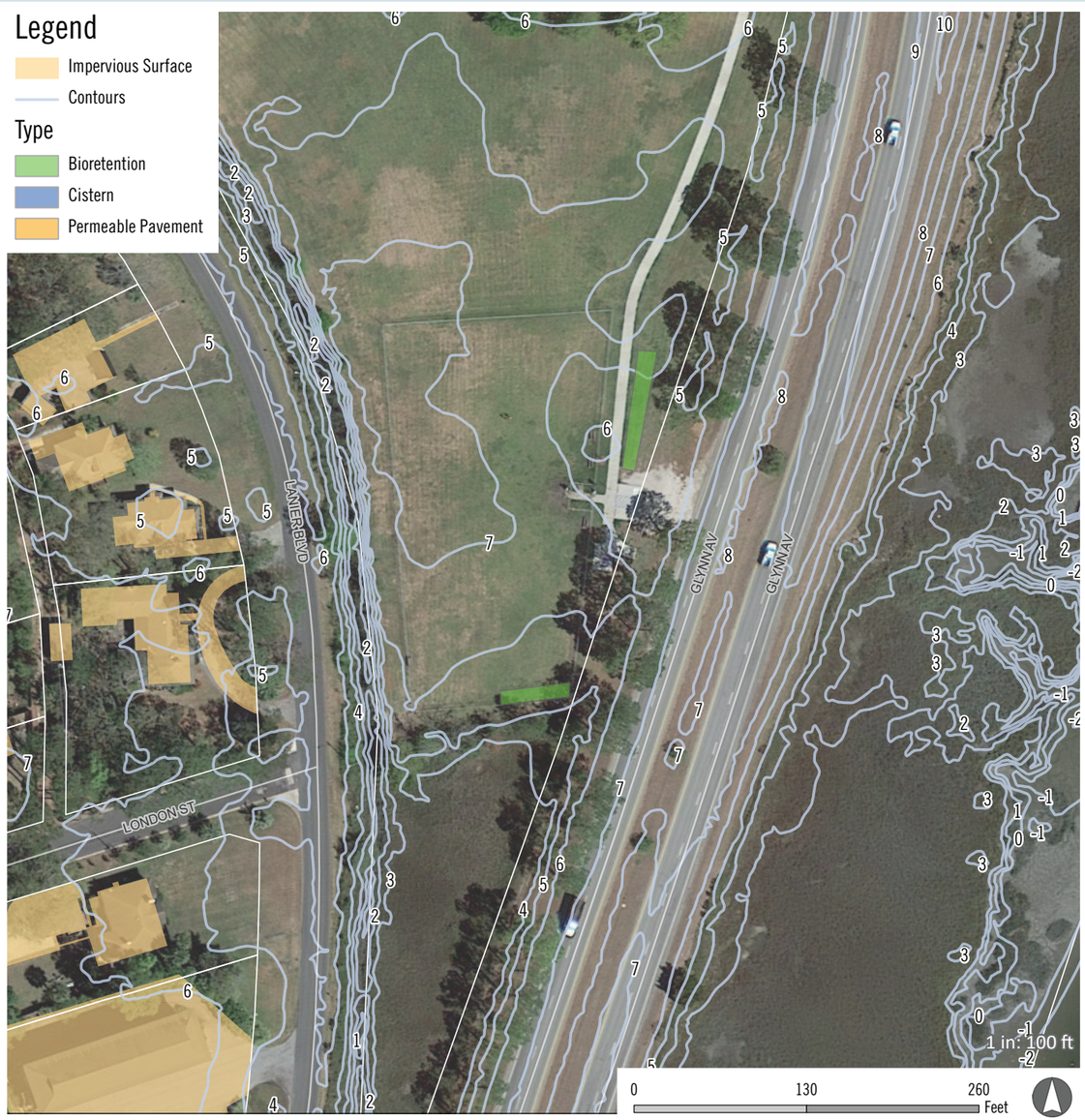
Howard Coffin Park

1402 Sonny Miller Way

DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
56,000 sq.ft	**0 sq. ft.**	**BIORETENTION**	**4,550 sq. ft.**	**5,750 cu. ft.**	**229,000 cu. ft.**	**1.71 MGAL**	**75% / 100%**	**1.41 MGAL / YR**	**$159,000**

OVERVIEW

Bioretention systems are proposed at the four corners of the main parking lot in Howard Coffin Park, located off Sonny Miller Way, to intercept stormwater from the existing storm sewer inlets.
A bioretention system adjacent to the new parking lot (entrance from Hwy 17) will also be used to intercept stormwater runoff prior to flowing into the marsh. Existing educational signage will be amended or added to help parkgoers understand the use of this green infrastructure.



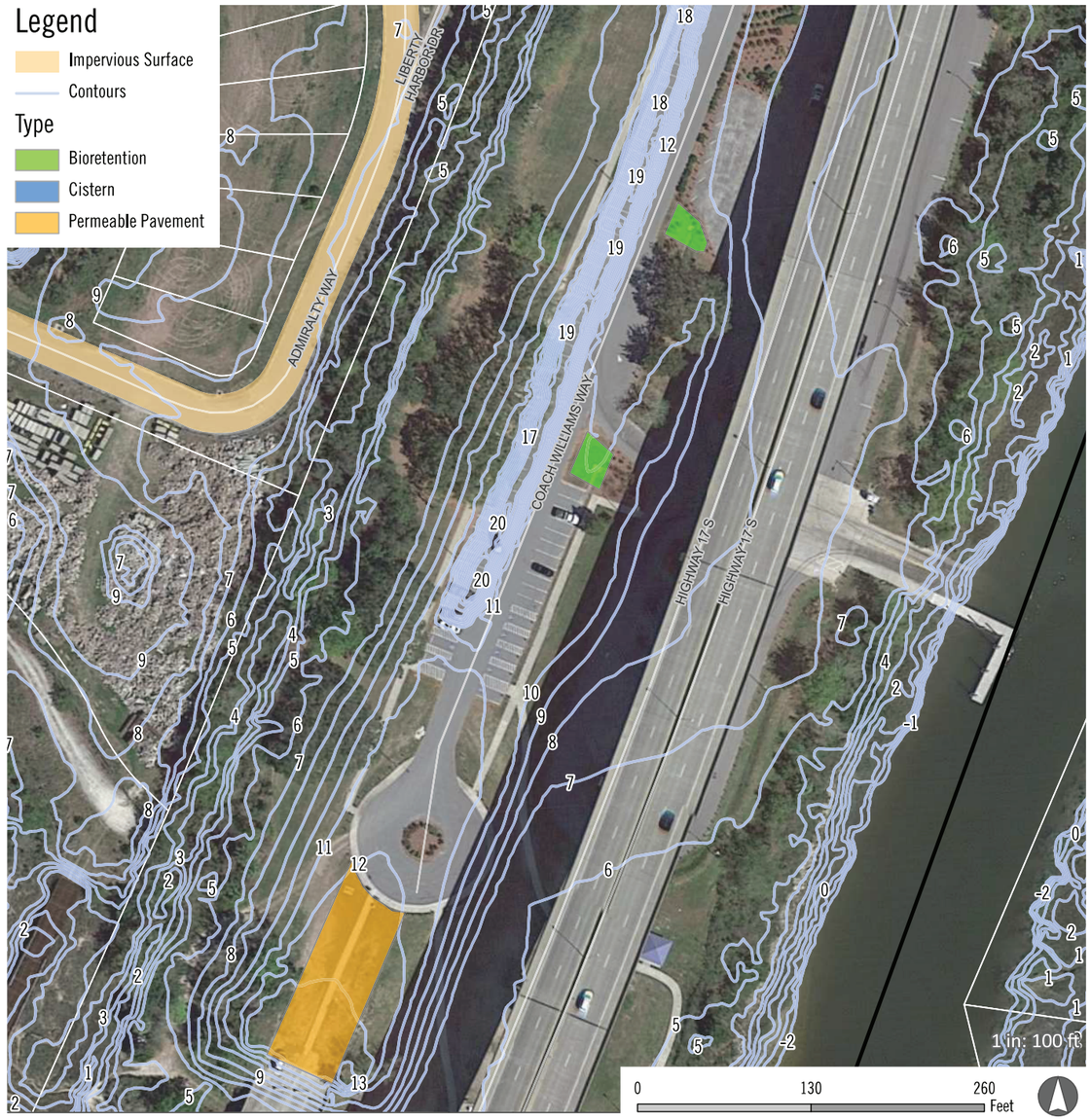
Dog Park at Howard Coffin Park

1116 Lanier Boulevard

DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
0 sq.ft	**43,000 sq. ft.**	**BIORETENTION**	**1,500 sq. ft.**	**BACTERIA HOT SPOT**	**N / A**	**N / A**	**100%**	**N / A**	**$43,000**

OVERVIEW

Two bioretention areas are proposed along the eastern and southern fence line of the Howard Coffin Park Dog Park to intercept runoff. The location is a potential pathogen hotspot and source of pollution to nearby waterways. These bioretention systems will route and filter stormwater runoff. The proposed placement of one system is outside of the dog park, but the other might require the southern fence to be shifted to provide a buffer with the marsh and reduce the potential of short-term standing water in the dog park.



DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
5,000 sq.ft	7,000 sq. ft.	PERMEABLE PAVEMENT	7,000 sq. ft.	1,140 cu. ft.	47,900 cu. ft.	0.36 MGAL	100%	0.36 MGAL / YR	UNDER CONSTRUCTION
14,000 sq.ft	0 sq. ft.	BIORETENTION	1,450 sq. ft.	1,465 cu. ft.	58,500 cu. ft.	0.44 MGAL	75%	0.33 MGAL / YR	$55,000

Liberty Ship Park

1 Coach Williams Way

OVERVIEW

Two bioretention systems and permeable pavement located at the base of the pier are recommended for Liberty Ship Park. The permeable pavement will intercept stormwater runoff from the pier and walkways. Stormwater runoff from the parking lot will be routed into a bioretention system. A second bioretention system will capture water from the boat-wash station, as well as parking lot runoff. Educational signage is recommended to explain the benefit of the green infrastructure practices. At the time of this plan resources are being leveraged to implement the proposed green infrastructure.

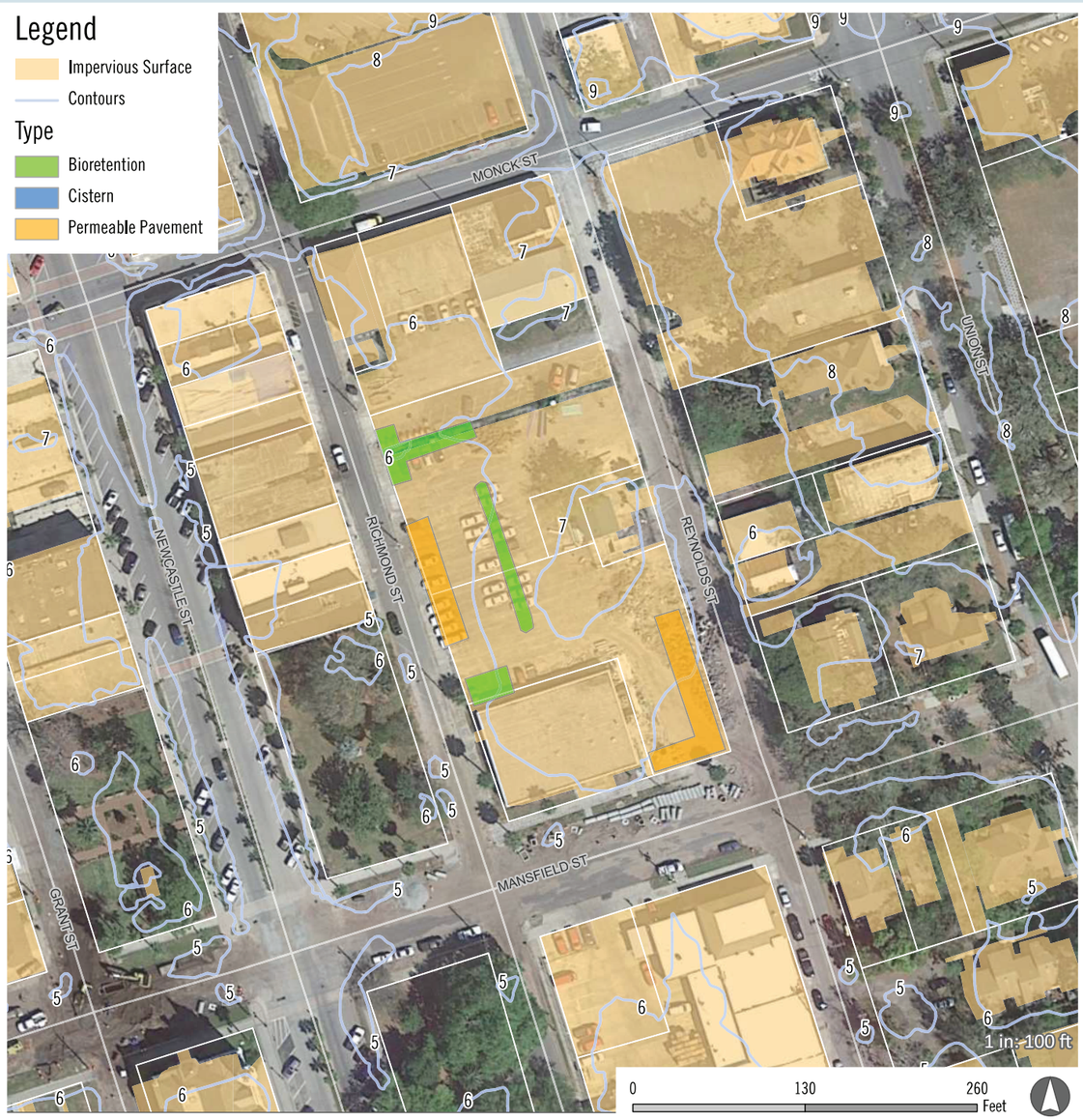
Albany Street *(F Street to G Street)*

1600 Block of Albany Street

DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
60,500 sq.ft	**0 sq. ft.**	**BIORETENTION**	**5,000 sq. ft.**	**6,220 cu. ft.**	**247,700 cu. ft.**	**1.85 MGAL**	**100%**	**1.85 MGAL / YR**	**$143,000**

OVERVIEW

Stormwater runoff from Albany Street and adjacent properties can be directed to a proposed bioretention system located in the median of the roadway between F and G Streets. The linear bioretention system will capture, treat, and infiltrate stormwater. At the time of this plan, this work is currently in design.



DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
15,300 sq.ft	**0 sq. ft.**	**PERMEABLE PAVEMENT**	**4,800 sq. ft.**	**1,450 cu. ft.**	**59,400 cu. ft.**	**0.44 MGAL**	**100%**	**0.44 MGAL / YR**	**$178,500**
33,300 sq.ft	**0 sq. ft.**	**BIORETENTION**	**3,500 sq. ft.**	**3,420 cu. ft.**	**136,500 cu. ft.**	**1.02 MGAL**	**100%**	**1.02 MGAL / YR**	**$115,000**

City Parking Lot *(Mansfield/Richmond)*

1300 Block of Richmond Street

OVERVIEW

Stormwater runoff from the parking lot can be captured in bioretention systems and permeable pavement located throughout the public lot. Permeable pavement is proposed in the parking stalls along Richmond Street and the western edge of the parking lot to capture and treat runoff that was not intercepted by one of the three bioretention systems proposed for retrofits from the existing landscape islands. Additionally, permeable pavement in the parking stalls in the southeast corner would capture and treat stormwater runoff from driving lanes.

City Lot *(Marshside)*

1240 Glynn Avenue

DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
14,000 sq.ft	**0 sq. ft.**	**PERMEABLE PAVEMENT**	**11,000 sq. ft.**	**1,325 cu. ft.**	**57,100 cu. ft.**	**0.43 MGAL**	**100%**	**0.43 MGAL / YR**	**$286,000**

OVERVIEW

Stormwater runoff from the parking lot currently flows north and east prior to directly entering the marsh. Permeable pavement is proposed in the city-owned portion of the parking lot to capture and infiltrate stormwater. It is noted that this system will need regular inspection due to the potential for clogging from flooding during extreme high tide events and natural disasters.

**Note – Bioretention shown is associated with Howard Coffin Park site (pages 30-31).*

City Right-Of-Way

(Ocean Avenue/Bon Air Avenue)

700 Block of Bon Air Avenue

DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
20,000 sq.ft	**0 sq. ft.**	**BIORETENTION**	**1,600 sq. ft.**	**2,050 cu. ft.**	**81,700 cu. ft.**	**0.61 MGAL**	**100%**	**0.61 MGAL / YR**	**$52,000**

OVERVIEW

Stormwater runoff from Johnston Street and along Ocean Avenue will be routed into a bioretention system located in the right-of-way. This bioretention system will capture, filter and infiltrate stormwater. A shallower system may be necessary due to the low elevations at this site.

DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
11,000 sq.ft	**0 sq. ft.**	**BIORETENTION**	**1,075 sq. ft.**	**1,150 cu. ft.**	**45,700 cu. ft.**	**0.34 MGAL**	**75%**	**0.26 MGAL / YR**	**$39,500**

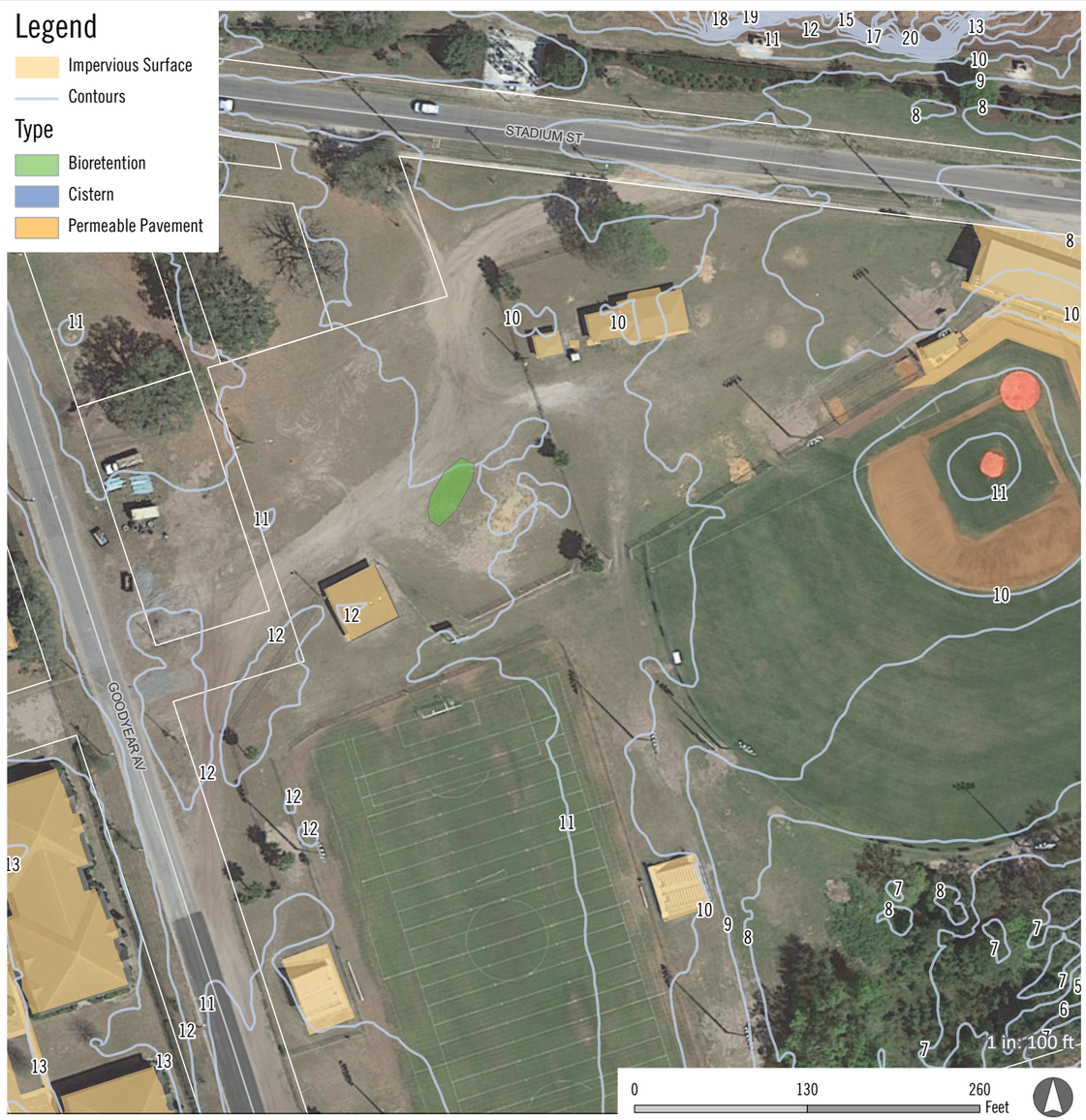
City Right-Of-Way

(Fifth Avenue/Union Street)

700 Block of Bon Air Avenue

OVERVIEW

A linear bioretention system can be used in the right-of-way along Union Street near the intersection with King and Prince Boulevard to capture, treat, and infiltrate stormwater. This bioretention system can utilize the existing storm inlet to manage flow from large events and an underdrain can be connected to this structure if the infiltration rate from the underlying soils is not sufficient.



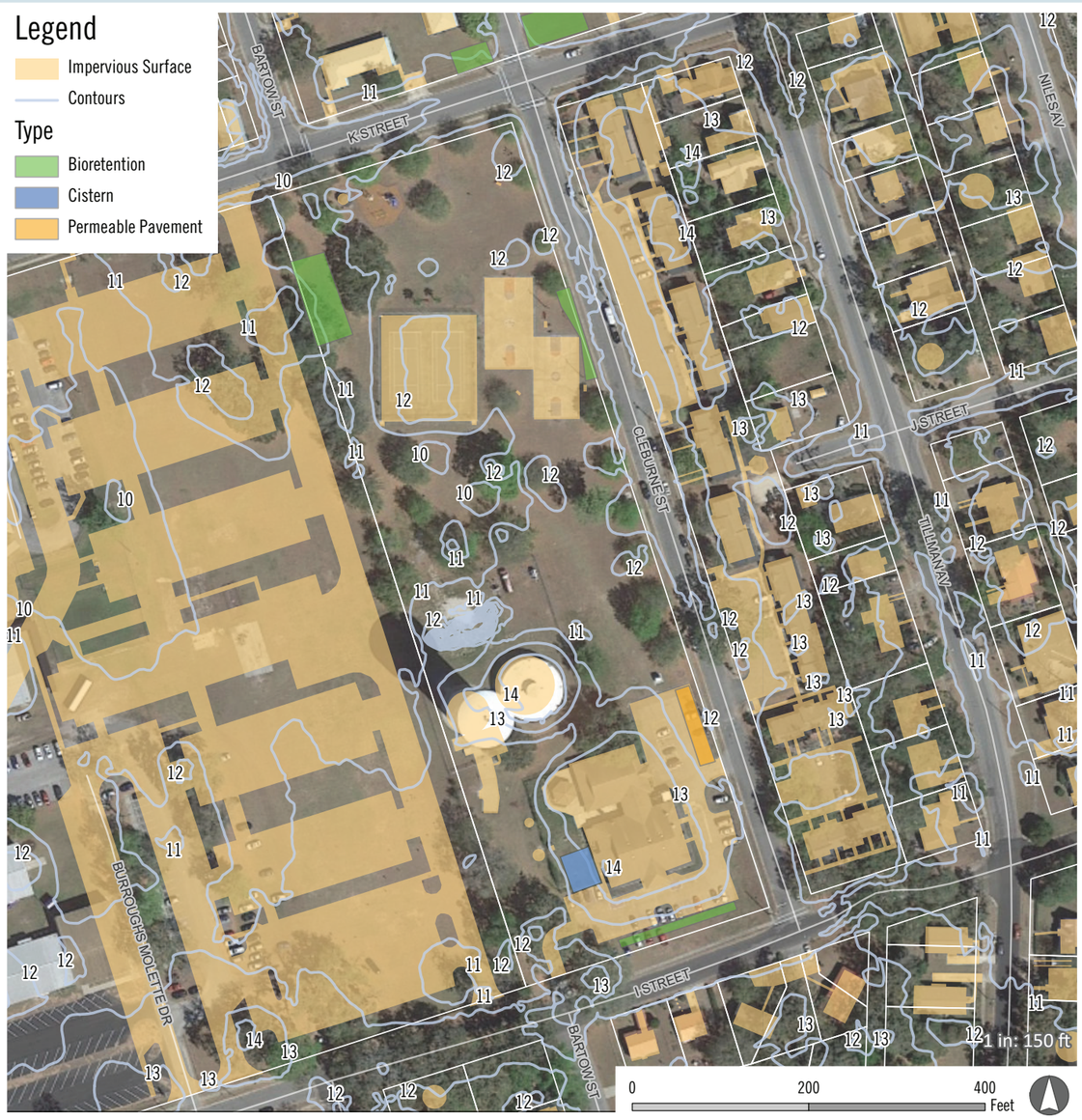
Edo Miller Park

2698 Stadium Street

DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
5,000 sq.ft	**7,000 sq. ft.**	**BIORETENTION**	**950 sq. ft.**	**1,230 cu. ft.**	**49,000 cu. ft.**	**0.37 MGAL**	**75%**	**0.27 MGAL / YR**	**$39,000**

OVERVIEW

Stormwater runoff from compacted roadways, new concrete parking pad, and buildings can be captured, treated, and infiltrated in a bioretention system located near the parking pad at Edo Miller Park. Depending on the infiltration rate of the existing soils an underdrain may be needed. Educational signage can be used to help ballpark visitors understand the use of this green infrastructure system.



DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
6,650 sq.ft	0 sq. ft.	PERMEABLE PAVEMENT	1,650 sq. ft.	630 cu. ft.	25,600 cu. ft.	0.19 MGAL	100%	0.19 MGAL / YR	$63,000
98,000 sq.ft	0 sq. ft.	BIORETENTION	6,600 sq. ft.	9,935 cu. ft.	395,000 cu. ft.	2.95 MGAL	100%	2.95 MGAL / YR	$219,000

Perry Park / Roosevelt Harris Center

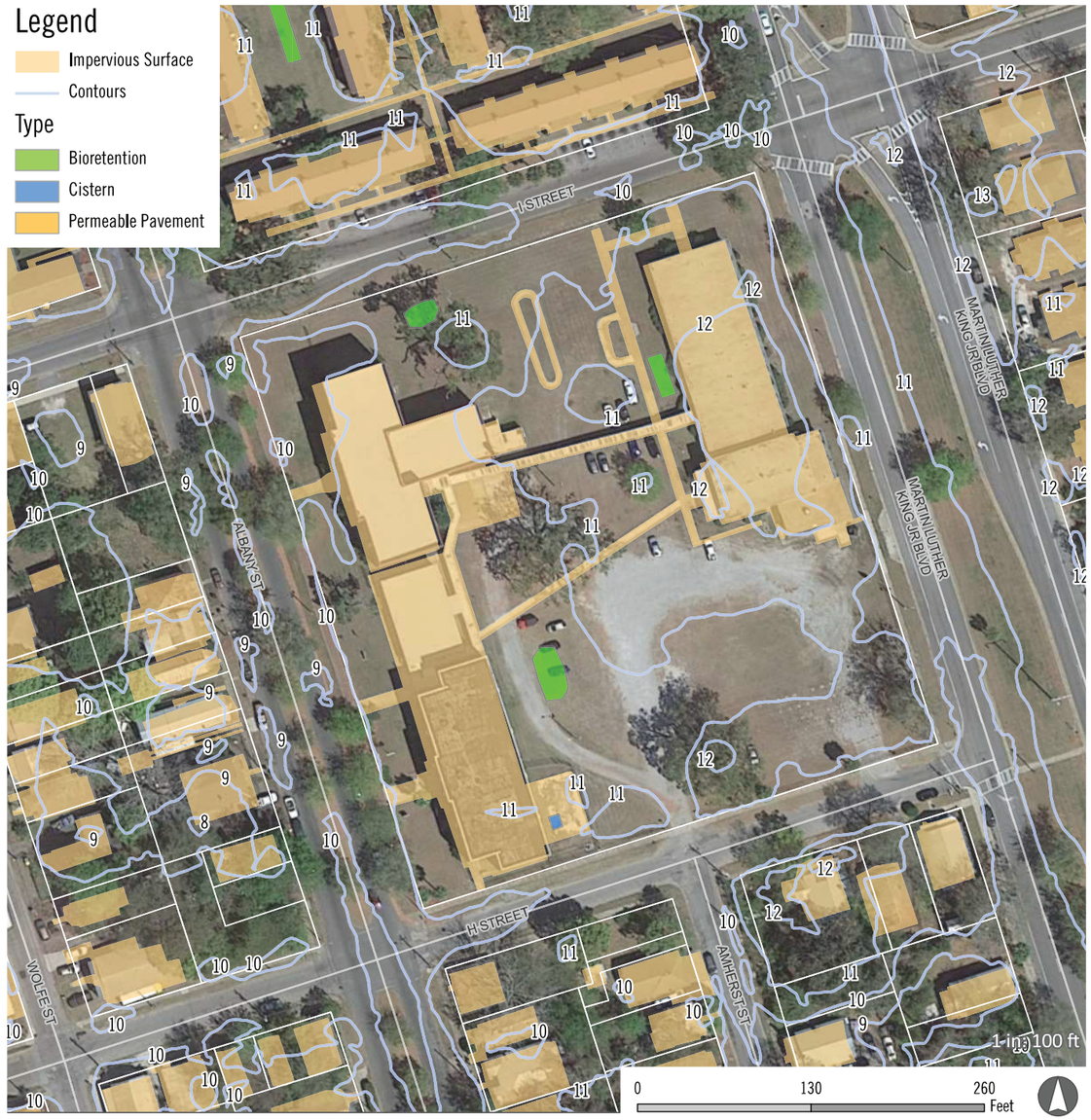
2007 I Street

OVERVIEW

A bioretention system and permeable pavement in the parking lot at the Roosevelt Harris Senior Citizens Center can be used to intercept, treat, store, and infiltrate stormwater. Additionally, a linear bioretention system along the northeast edge of the property (Cleburne Street) can be used to treat stormwater runoff from adjacent basketball courts. On the northwest corner of the property, a bioretention system can be used to alleviate the strain and concentrated flow within the channel bordering Burroughs-Molette Elementary. A cistern is proposed to capture roof runoff to offset irrigation of the community gardens at the center.

Risley High School

1800 Albany Street



DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
18,800 sq.ft	**1,500 sq. ft.**	**BIORETENTION**	**1,550 sq. ft.**	**2,070 cu. ft.**	**82,600 cu. ft.**	**0.62 MGAL**	**100%**	**0.62 MGAL / YR**	**$51,500**

OVERVIEW

Three bioretention systems are proposed for Risley High School and adjacent buildings. These bioretention systems would capture, treat and infiltrate stormwater runoff from rooftops. Additionally, a cistern is proposed for the southeast corner of the building, along H Street, to capture roof runoff via the southernmost downspout. The cistern would become an available water source for the community garden located at this property. Educational signage to explain the use and benefit of these green infrastructure practices is proposed.

Glynn Academy

1001 Mansfield Street

DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
85,000 sq.ft	**0 sq. ft.**	**BIORETENTION**	**6,500 sq. ft.**	**8,695 cu. ft.**	**345,800 cu. ft.**	**2.59 MGAL**	**75%**	**1.94 MGAL / YR**	**$243,500**

OVERVIEW

Bioretention systems are proposed to be retrofitted in various green spaces on the Glynn Academy campus such that existing downspouts can be redirected to disconnect roof runoff from the storm sewer system. Several roofs will either need new gutters or a shallow swale to convey stormwater runoff to the bioretention systems. These systems will also target additional stormwater runoff from walkways to capture, treat and infiltrate stormwater from this highly impervious site. Educational signage can be used throughout campus to explain the function and benefit of these green infrastructure systems.

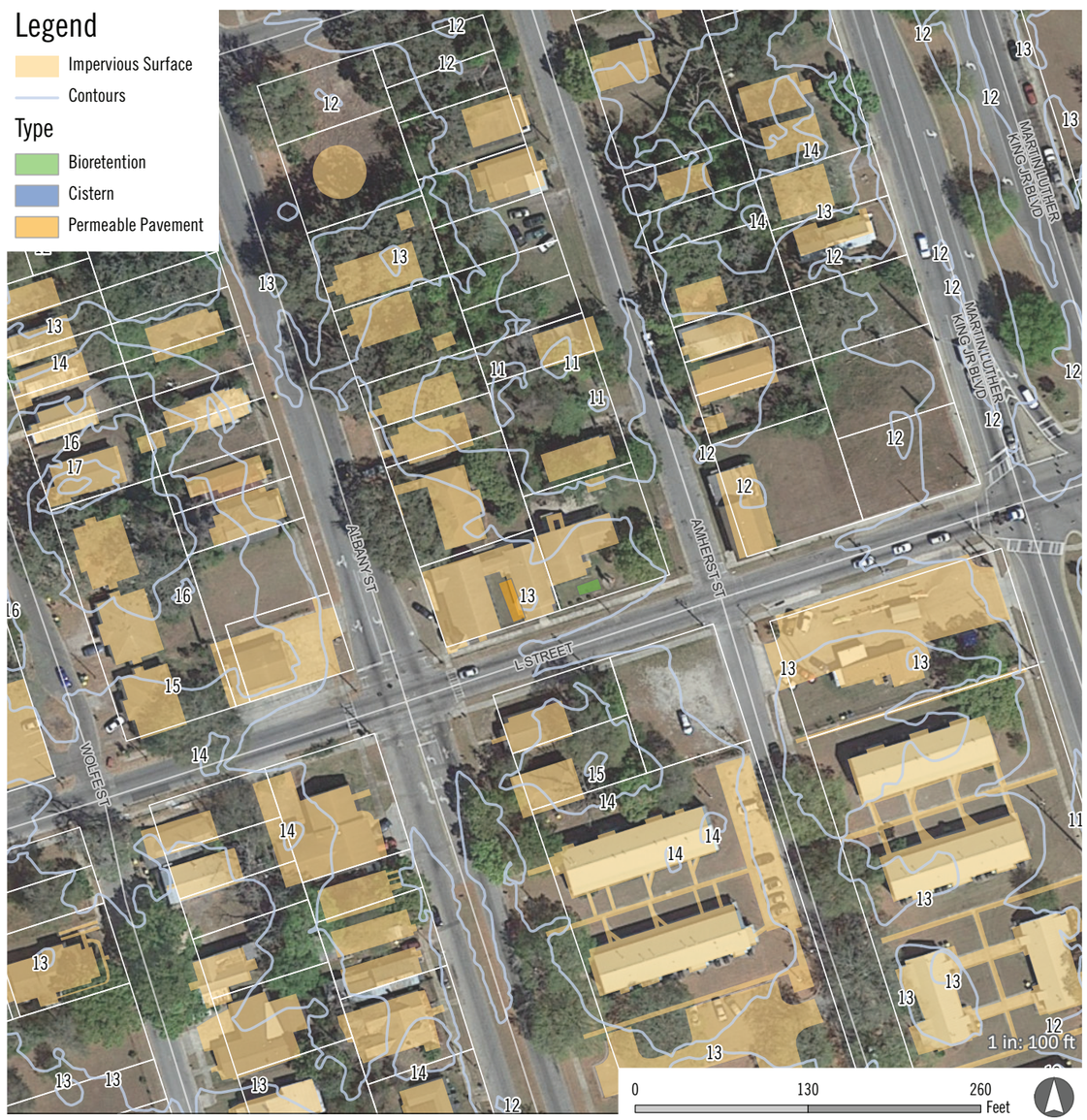
Glynn Middle School

511 Lanier Boulevard

DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
80,000 sq.ft	**0 sq. ft.**	**BIORETENTION**	**7,900 sq. ft.**	**8,350 cu. ft.**	**332,900 cu. ft.**	**2.49 MGAL**	**75%**	**1.87 MGAL / YR**	**$295,500**

OVERVIEW

An existing detention basin in the median along the northwest corner of the parking lot can be retrofitted to a bioretention system. Stormwater runoff from the parking lot, driving lane, and potentially from the northern half of the easternmost building can be routed to this system and infiltrated. The landscaped islands along the eastern edge of the parking lot, at the school entrance can also be retrofitted for bioretention, allowing for the remaining stormwater runoff from the parking lot to be captured, treated and infiltrated prior to reaching the adjacent marsh.



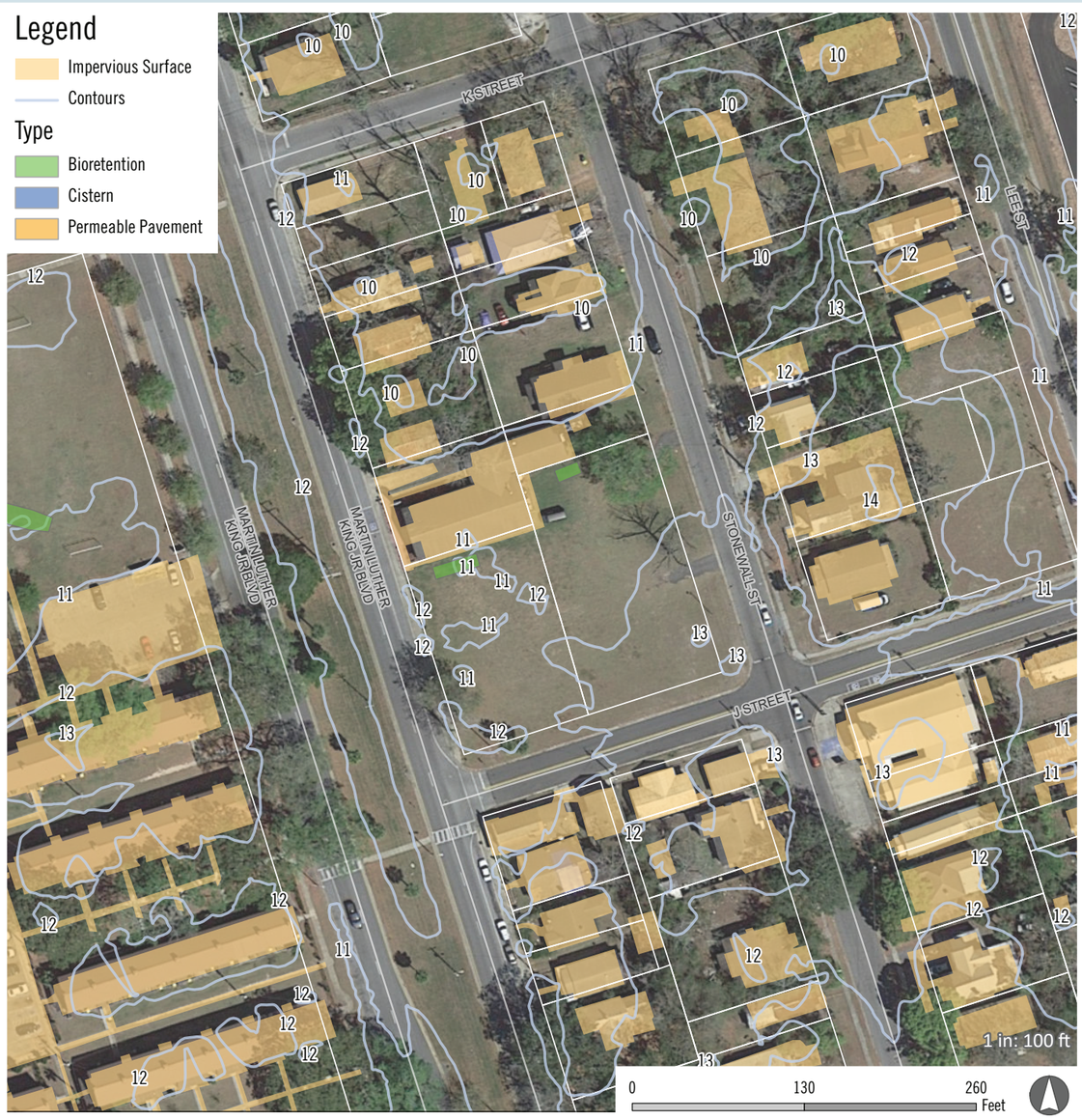
DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
1,500 sq.ft	0 sq. ft.	PERMEABLE PAVEMENT	350 sq. ft.	175 cu. ft.	7,100 cu. ft.	0.05 MGAL	100%	0.05 MGAL / YR	$13,750
2,250 sq.ft	0 sq. ft.	BIORETENTION	150 sq. ft.	230 cu. ft.	9,100 cu. ft.	0.07 MGAL	100%	0.07 MGAL / YR	$5,000

Payne Chapel AME Church

2204 Albany Street

OVERVIEW

A bioretention system adjacent to the church sign is proposed to capture, treat and infiltrate stormwater runoff from adjacent buildings. Permeable pavement can be added to the interior courtyard to infiltrate additional roof runoff. This area is currently used for parking, so this GI/LID type will allow it to remain available for that use.



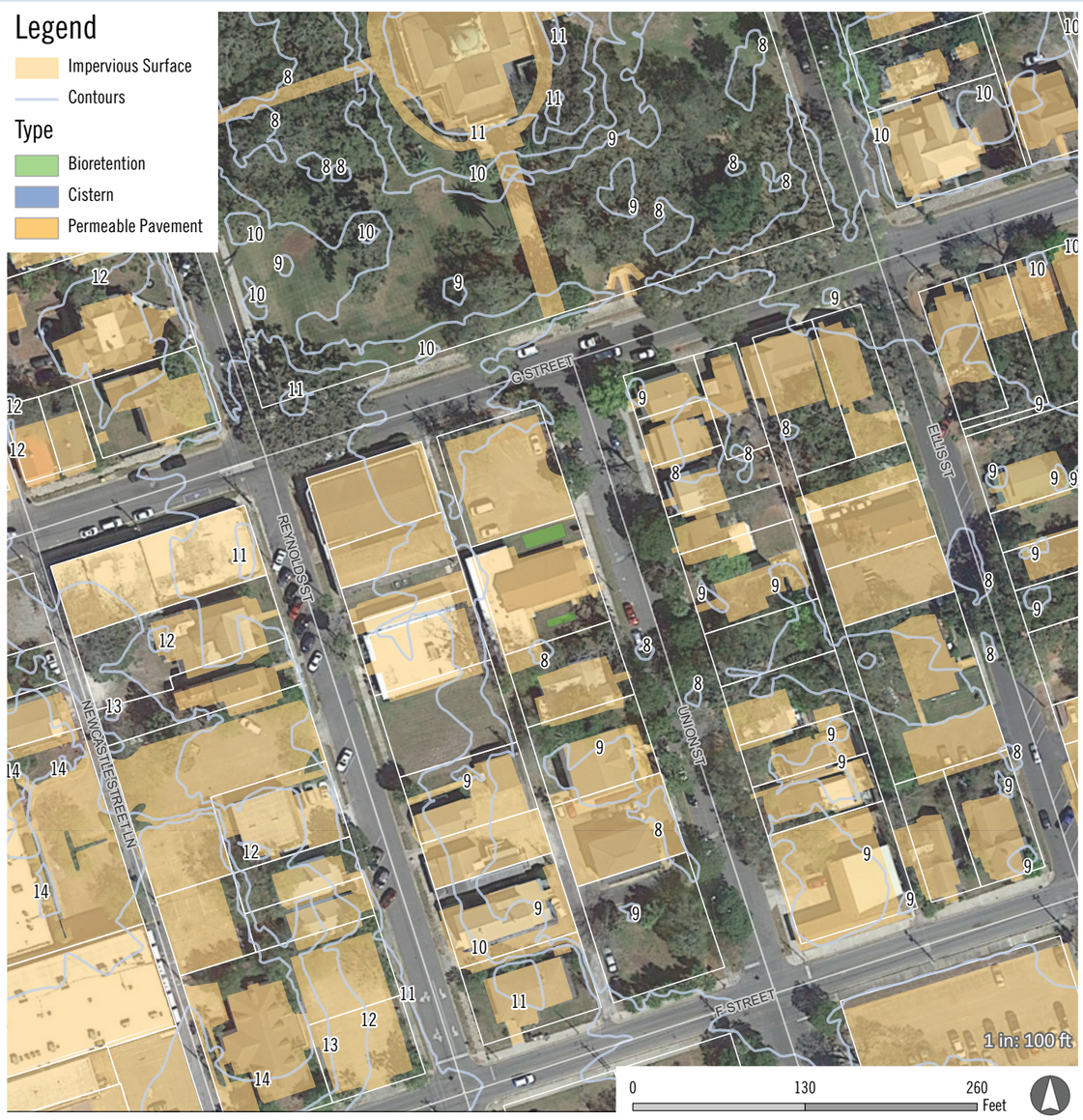
Jordan Grove First Baptist Church

2004 Martin Luther King Jr. Boulevard

DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
3,800 sq.ft	**0 sq. ft.**	**BIORETENTION**	**500 sq. ft.**	**410 cu. ft.**	**16,300 cu. ft.**	**0.12 MGAL**	**100%**	**0.12 MGAL / YR**	**$16,500**

OVERVIEW

Two bioretention systems are proposed alongside the southern edges of the church. These oversized bioretention systems would capture, treat, and infiltrate stormwater runoff from the rooftop and adjacent grassed parking areas.



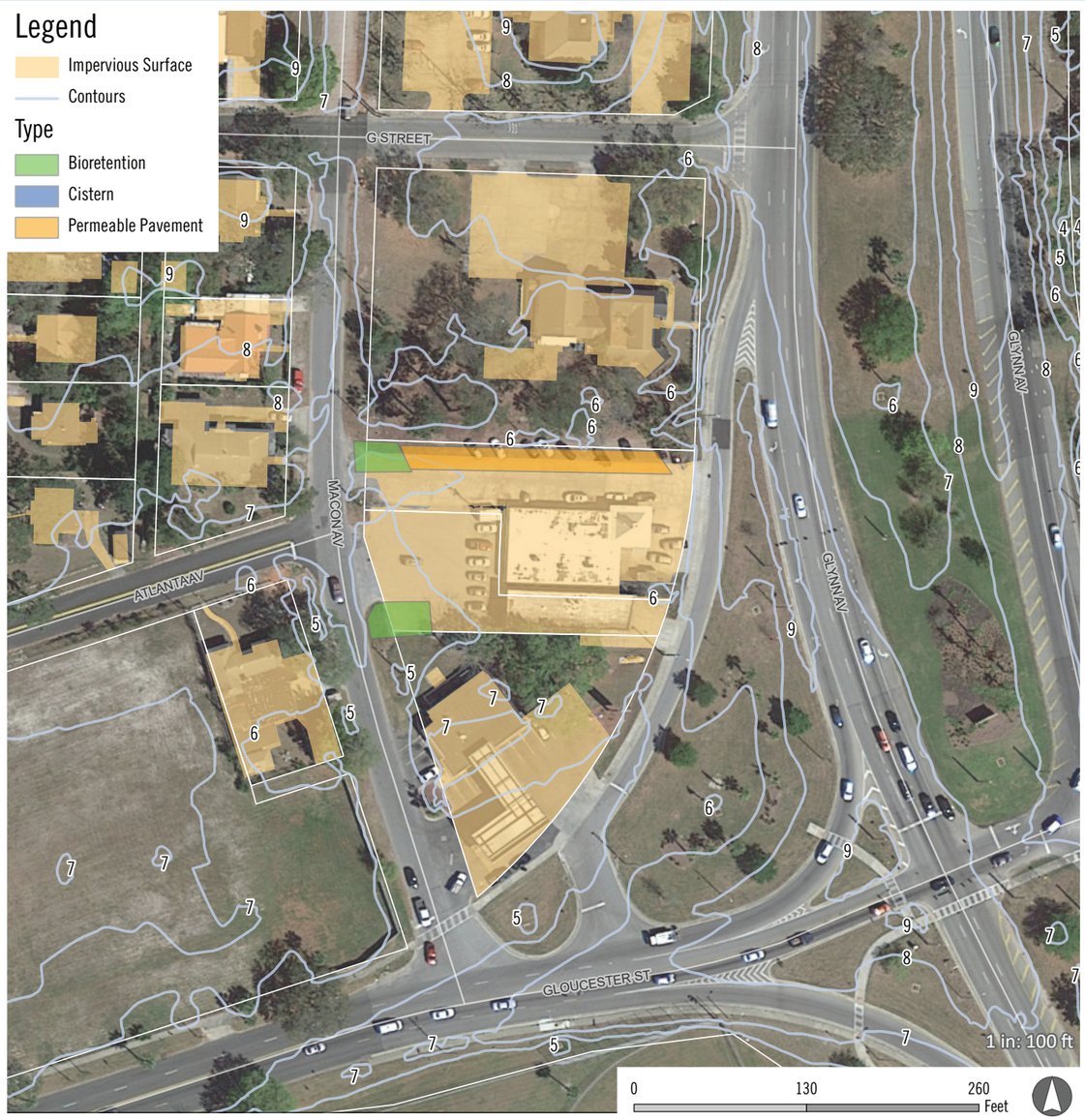
Salvation Army

1623 Union Street

DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
7,500 sq.ft	**0 sq. ft.**	**BIORETENTION**	**500 sq. ft.**	**760 cu. ft.**	**30,200 cu. ft.**	**0.23 MGAL**	**100%**	**0.23 MGAL / YR**	**$16,500**

OVERVIEW

Existing green space will be retrofitted with bioretention systems to intercept and infiltrate stormwater runoff from rooftops of adjacent buildings. Additionally, the northernmost bioretention system is proposed to accept stormwater runoff from the adjacent parking lot at the corner of Union and G Streets.



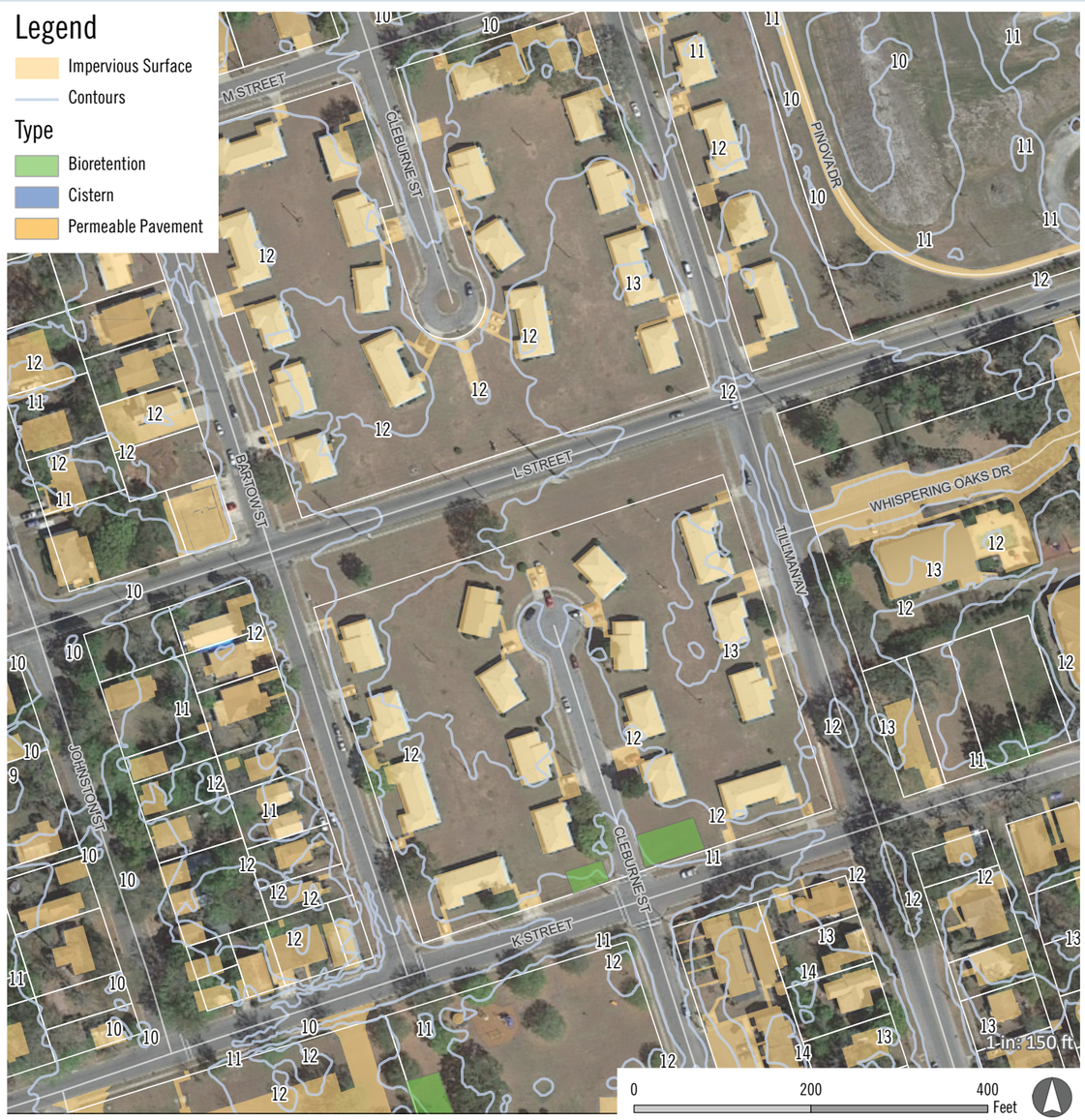
DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
5,500 sq.ft	**0 sq. ft.**	**PERMEABLE PAVEMENT**	**3,500 sq. ft.**	**520 cu. ft.**	**22,100 cu. ft.**	**0.17 MGAL**	**100%**	**0.17 MGAL / YR**	**$97,000**
25,000 sq.ft	**0 sq. ft.**	**BIORETENTION**	**2,100 sq. ft.**	**2,425 cu. ft.**	**96,500 cu. ft.**	**0.72 MGAL**	**75%**	**0.54 MGAL / YR**	**$77,500**

Hello Goodbuy Thrift Store

1523 Glynn Avenue

OVERVIEW

Permeable pavement is proposed to replace existing parking stalls located along the northern edge of the property. Overflow from this system, as well as runoff from the driving lane, rooftop and adjacent parking lot can be directed to one of two bioretention systems located on the western edge of the property. The bioretention systems' underdrains can be tied into the existing storm sewer system.



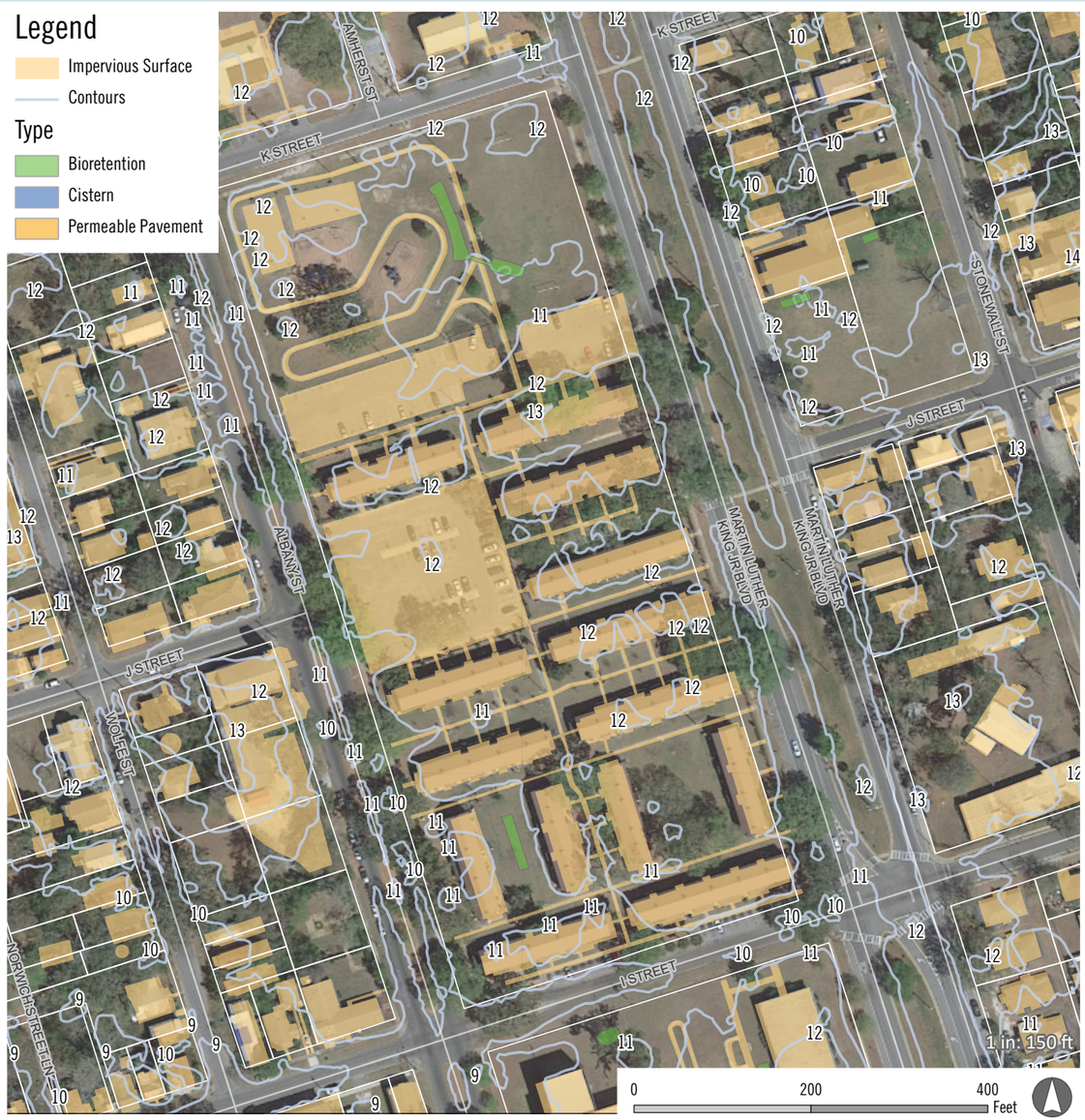
Abbott Andrews Terrace

1 Abbott Andrews Terrace

DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
48,000 sq.ft	**0 sq. ft.**	**BIORETENTION**	**3,750 sq. ft.**	**4,920 cu. ft.**	**195,600 cu. ft.**	**1.46 MGAL**	**75%**	**1.10 MGAL / YR**	**$139,500**

OVERVIEW

The southern section of the Abbott Andrews Terrace can be retrofitted along the corners of Cleburne and K Streets with bioretention systems. These bioretention systems will intercept stormwater runoff from the cul-de-sac portion of Cleburne Street and adjacent homes. The bioretention systems will capture, treat, infiltrate and diffuse the flow of stormwater runoff.



DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
26,000 sq.ft	**0 sq. ft.**	**BIORETENTION**	**2,800 sq. ft.**	**2,740 cu. ft.**	**109,200 cu. ft.**	**0.82 MGAL**	**75% / 100%**	**0.66 MGAL / YR**	**$103,000**

McIntyre Court

1900 & 2000 Blocks of Albany Street

OVERVIEW

The existing channel and detention system throughout the northern end of the property can be retrofitted for a linear bioretention system that will capture, treat and infiltrate stormwater runoff. The existing outlet structure will be modified for the design of the bioretention system overflow. A potential bioretention system can also be located within the courtyard in the southwest corner of the property.

Hopkins Homes

800 & 900 Blocks of Oglethorpe Street

DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
68,000 sq.ft	**0 sq. ft.**	**BIORETENTION**	**5,250 sq. ft.**	**6,960 cu. ft.**	**276,900 cu. ft.**	**2.07 MGAL**	**75% / 100%**	**1.80 MGAL / YR**	**$184,000**

OVERVIEW

Five small, linear bioretention systems are proposed in the courtyards of housing complexes to intercept, treat and infiltrate stormwater runoff from buildings. Additionally, one large bioretention system is proposed in the large greenspace north of Prince Street. A swale or inlet channel is included on the uphill side of the existing stormwater inlet at the corner of Prince and Oglethorpe Streets to intercept stormwater runoff traveling south down Oglethorpe Street for treatment and infiltration in the bioretention system.

College Park *(Empty lot)*

4828 Palamar Drive

DISCONNECTION AREA		TREATMENT AREA		RUNOFF VOLUME			RUNOFF REDUCTION / RECHARGE		ESTIMATED COST
IMPERVIOUS	COMPACTED	GI / LD TYPE	GI / LID AREA	WATER QUALITY EVENT DEPTH (1.2")	ANNUAL RAINFALL (50")		CREDIT	ESTIMATED VOLUME	CONSTRUCTION
70,000 sq.ft	**0 sq. ft.**	**BIORETENTION**	**7,500 sq. ft.**	**7,360 cu. ft.**	**293,800 cu. ft.**	**2.20 MGAL**	**75%**	**1.65 MGAL / YR**	**$277,000**

OVERVIEW

A linear bioretention system will be located along Palamar and Malabar Drives. This bioretention system can receive stormwater from roadways that is redirected via existing storm sewer inlets where it is captured, treated, and infiltrated. This entire property can be considered for larger scale retention to promote infiltration of stormwater from larger rain events.

Appendix A: Other Sites Considered

Locations presented in this appendix were identified by the project team and evaluated in the field; however, due to physical conditions or phases of development/redevelopment, current conditions did not support green infrastructure/low impact development (GI/LID) opportunities at this time.

NONSTRUCTURAL EDUCATION OPPORTUNITIES

The following sites have planned or potential redevelopment/expansions, so targeted GI/LID education is recommended during redevelopment planning:

SOUTHEAST GEORGIA HEALTH SYSTEM *Brunswick Campus*

- **Parcels:** multiple; 01-05834 (main)
- **Notes:** Areas around the hospital are prone to flooding. The hospital currently has several applications of pervious concrete, including one lot that is approximate 1-acre.
- **GI/LID Soil Suitability:** Moderate (depth to water table 18”-42”; HSG = C).

Recommendation: *Consider opportunities for further implementation of GI/LID with redevelopment and future expansions.*

FORMER REYNOLDS SCHOOL SITE

- **Parcels:** 01-04148
- **Notes:** School was demolished and impervious surfaces removed, currently a vacant lot.
- **GI/LID Soil Suitability:** Moderate (depth to water table 18”-42”; HSG = C).

Recommendation: *Consider GI/LID opportunities when redeveloped.*

ZION BAPTIST CHURCH

- **Parcels:** Multiple; future site expansion at 01-02417
- **Notes:** Zion Baptist Church owns multiple parcels in the 1600 and 1700 block of G Street. A future expansion is planned at 1711 G Street, which is currently a vacant lot.
- **GI/LID Soil Suitability:** Moderate (depth to water table 18”-42”; HSG = C).

Recommendation: *Consider GI/LID opportunities for planned expansion and explore retrofit opportunities for existing impervious areas.*

OTHER ASSESSED FIELD SITES

No GI/LID opportunities were identified at this time for the remaining “other assessed” field sites. Recommendations are provided based on field assessment and the possibility of future retrofit opportunities for the following sites:

MAGNOLIA PARK NEIGHBORHOOD

- **Parcels:** City Right-Of-Way & multiple private parcels
- **Site Description:** Most of neighborhood from Rosetta to Peachtree Street and Habersham to Altama Avenue experienced flooding issues.
- **Notes:** Drainage improvements were designed, and construction is complete.
- **GI/LID Soil Suitability:** Moderate (depth to water table 18”-30”; HSG = A).

Recommendation: *After construction is complete, monitor site, and pursue additional retrofits, as needed.*

BRUNSWICK COMMONS

- **Parcels:** 01-06572
- **Site Description:** New development off of Coral Park Drive was recently constructed.
- **Notes:** The ditches behind here already have a lot of flow from Magnolia Park, so look for opportunities in area.
- **GI/LID Soil Suitability:** Moderate (depth to water table 18”-30”; HSG = A).

Recommendation: *Due to recent development and the new construction, there are limited opportunities to retrofit this site.*

LAKESIDE DRIVE POND

- **Parcels:** Multiple private parcels
- **Site Description:** Pond near the vicinity of the hospital drains to Wildwood Ditch, and it is privately owned. A low-flow orifice was removed to create a permanent pool.
- **Notes:** Assessment of outlet structure modification is pursued as part of Wildwood Ditch drainage improvement project.

Recommendation: *Pursue agreement with property owners to install real-time control outlet structure that will release water ahead of storms to increase storage.*

ROSEWOOD AVENUE AND PALAMAR DRIVE *RL Buyouts*

- **Parcels:** To be determined
- **Site Description:** Several repetitive loss properties on Rosewood Avenue and Palamar Drive are being pursued for buyout through a hazard mitigation grant.
- **GI/LID Soil Suitability:** Low/None (depth to water table 0”-6”; HSG = A/D).

Recommendation: *Consider GI/LID opportunities with the future green space.*

WILDWOOD DITCH

- **Parcels:** Multiple private parcels and city drainage easement
- **Site Description:** The ditch that flows between Boxwood Street and Wildwood Drive regularly floods and is difficult to maintain.
- **Notes:** The city hired a consultant to design drainage improvements for this area.
- **GI/LID Soil Suitability:** Low/None (depth to water table 0”-6”; HSG = A/D).

Recommendation: *None.*

NORTH OF PARKWOOD DRIVE TO WILDWOOD DRIVE

- **Parcels:** City Right-Of-Way & multiple private parcels
- **Site Description:** Redondo Road and Wildwood Drive regularly flood.
- **Notes:** Based on level of development, there are limited opportunities for GI/LID. Wildwood Ditch improvements have been designed, so this should alleviate some of the flooding. Another option is to pursue ROW expansion to implement ROW bioswales or property acquisition for a larger, regional project.
- **GI/LID Soil Suitability:** Moderate (depth to water table 18”-42”; HSG = C).

Recommendation: *Further investigation with soil testing to find optimal locations for ROW bioswales or acquisition.*

SOUTH OF PARKWOOD DRIVE TO HOPKINS AVENUE

- **Parcels:** City Right-Of-Way and multiple private parcels
- **Site Description:** The area of Hopkins to Parkwood (all along Parkwood) and Mimosa to Hunter and beyond regularly flood
- **Notes:** Based on level of development, there are limited opportunities for GI/LID. Another option is to pursue ROW expansion to implement ROW bioswales or property acquisition for a larger, regional project, such as a GI/LID park in a future empty lot.

- **GI/LID Soil Suitability:** Moderate (depth to water table 18”-42”; HSG = C).

Recommendation: *Further investigation with soil testing to find optimal locations for ROW bioswales or acquisition.*

ALTAMA AVENUE / PARKWOOD DRIVE

- **Parcels:** Mostly City Right-Of-Way
- **Site Description:** Flooding hot spot identified in Stormwater Masterplan.
- **Notes:** Could have 3-4 ft of floodwater here.
- **GI/LID Soil Suitability:** Moderate (depth to water table 18”-42”; HSG = C); however, due to depth of flooding here, a gray solution and property acquisition would likely be a better fit. Once land acquired, could pursue a gray solution with green elements.

Recommendation: *Property acquisition, regional detention/pipe upsizing.*

PINOVA / HERCULES

- **Parcels:** 01-03935
- **Site Description:** Flooding is caused when debris builds up on trash rack where storm drain enters Pinova property at N Street and Tillman Avenue.
- **Notes:** Flooding due to buildup of debris on trash rack is not an issue in which GI/LID can solve.
- **GI/LID Soil Suitability:** Moderate (depth to water table 18”-42”; HSG = C); however, due to industrial site, placement of infiltrating stormwater practices should be investigated with more detail.

Recommendation: *Local partners are considering innovative projects with private industry to reduce litter within Glynn County. If effective, this location should be considered.*

FORMER PERRY SCHOOL SITE *Now Perry Place*

- **Parcels:** 01-04515
- **Site Description:** Former Perry School site was developed as “Perry Place” an affordable housing complex.
- **Notes:** At start of “RR Plan” project, this site had not been constructed, but based on the ensuing development, no options for retrofits were explored.
- **GI/LID Soil Suitability:** Moderate (depth to water table 18”-42”; HSG = C).

Recommendation: *None.*

L STREET / WOLFE STREET

- **Parcels:** Mostly City Right-Of-Way
- **Site Description:** Point placed at L Street and Wolfe Street
- **Notes:** Considering other projects in area. No obvious opportunities from L to K Streets on Norwich Lane, Wolfe Street, and Albany Street. City recently upgraded L Street, east of MLK Jr. Blvd.
- **GI/LID Soil Suitability:** Moderate (depth to water table 18"-42"; HSG = C).

Recommendation: *None.*

K STREET *Between Union / Reynolds Street*

- **Parcels:** Mostly City Right-Of-Way
- **Site Description:** Point placed at K Street between Union/Reynolds Streets
- **Notes:** Along Reynolds and Union, there are no storm inlets from L to I Street (3 blocks).
- **GI/LID Soil Suitability:** Moderate (depth to water table 18"-42"; HSG = C).

Recommendation: *Further investigation. The north-to-south roadways have a narrow ROW, so options include: (1) ROW GI/LID practices along lettered streets, (2) acquisition of property, or (3) installation of new inlets/pipes with option (1).*

MACON / TALMADGE AVENUES

- **Parcels:** Mostly City Right-Of-Way
- **Site Description:** This intersection regularly floods due to limited drainage capacity and tidal influence.
- **Notes:** The city hired a consultant to design drainage improvements for this area. In addition, several residents installed residential rain gardens in areas that drain to this location.
- **GI/LID Soil Suitability:** Moderate (depth to water table 18"-42"; HSG = C).

Recommendation: *Implement drainage improvements and continue to encourage use of residential rain gardens in this neighborhood.*

TALMADGE AVENUE ROW DITCHES

- **Parcels:** Mostly City Right-Of-Way
- **Site Description:** This roadway regularly floods and contributes flow to intersection of Macon Avenue.
- **Notes:** The City hired a consultant to design drainage improvements for this area. In addition, several residents installed residential rain gardens in areas that drain to this location.

- **GI/LID Soil Suitability:** Moderate (depth to water table 18"-42"; HSG = C).

Recommendation: *Implement drainage improvements and continue to encourage use of residential rain gardens in this neighborhood.*

MANSFIELD / OLD CITY HALL

- **Parcels:** City Right-Of-Way, City Squares, City Hall (01-01623)
- **Site Description:** Mansfield Street was recently constructed, and Newcastle Street has a recent streetscape.
- **Notes:** Area is subject to street flooding.
- **GI/LID Soil Suitability:** Moderate (depth to water table 18"-42"; HSG = C).

Recommendation: *Explore GI/LID options with future upgrades.*

MARSH WINDS APARTMENTS

- **Parcels:** City Right-Of-Way & private parcels (01-07222, 01-01300)
- **Site Description:** The area in front of these apartments and along Lanier Blvd regularly floods, sometimes it is tidally influenced.
- **Notes:** Assessed the site and based on very low elevations, it does not seem suitable for infiltrating GI/LID practices. A constructed stormwater wetland would likely be more suitable, but permitting would be a challenge.
- **GI/LID Soil Suitability:** Moderate (depth to water table 18"-42"; HSG = C).

Recommendation: *None.*

FOURTH AVENUE / LANIER BLVD.

- **Parcels:** 01-07065, 01-07767
- **Site Description:** Planned multi-family development, private parcels.
- **Notes:** Area is low-lying, adjacent to wetlands, and Lanier Blvd floods regularly.
- **GI/LID Soil Suitability:** Low/None (depth to water table 0"-12"; HSG = B/D). Most likely practice is a constructed stormwater wetland.

Recommendation: *Due to flooding in vicinity, ensure developer addresses SW management.*

COLLEGE PARK NEIGHBORHOOD

- **Parcels:** City Right-Of-Way & multiple private parcels
- **Site Description:** The roadway along Malabar Drive and Palamar Drive regularly flood.
- **Notes:** Area is subject to flooding. The City and County completed an assessment of localized flooding and are pursuing a gray infrastructure solution.
- **GI/LID Soil Suitability:** Moderate (depth to water table 18"-30"; HSG = A).

Recommendation: *Consider GI/LID opportunities listed in other parts of the neighborhood. Monitor site post construction and pursue additional retrofits, as needed.*

Appendix B: Additional Design Details

The specific design assumptions from the GSMM that were used to size the GI/LID practices include:

- Runoff Calculation Method = **Simple Method**
- Design Rainfall Event = **1.2 inches**
- Underdrain Credit = **75% for Internal Water Storage**
  = **100% for no underdrain**
- Available porosity for bioretention media = **25%**
- Available porosity for gravel in bioretention = **40%**
- Minimum bioretention media depth = **1.5 feet**
- Available porosity for pervious concrete = **20%**
- Available porosity for gravel in permeable pavement = **32%**

The unit rates used to estimate construction cost for this plan were as follows:

BIORETENTION

- Bioretention Media: **$85/CY**
- Gravel: **$85/CY**
- Geotextile: **$2.50/SF**
- Excavation/Grading/Removal: **$55/CY**
- Vegetation: **$6/SF**
- Underdrain: **$25/LF**
- Miscellaneous (inlets, curbing, etc): **20% of construction cost**
- Contingency: **20% of total cost**

PERMEABLE PAVEMENT

- Surface Material
  - Pervious Concrete: **$12/SF**
  - PICP and bedding layers: **$17.50/SF**
- Gravel: **$85/CY**
- Geotextile: **$2.50/SF**
- Excavation/Grading/Removal: **$55/CY**
- Flush Curb: **$15/LF**
- Mobilization/Layout/E&S: **10% of construction cost**
- Demolition: **10% of construction cost if the practice required removal of existing impervious surface**
- Contingency: **15% of total cost**

Appendix C: Maintenance

Stormwater management systems and green infrastructure, like all types of infrastructure, must be maintained for performance. Additional maintenance resources can be found at https://gacoast.uga.edu/stormwater-management/ and in Appendix E of the Georgia Stormwater Management Manual.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Georgia Sea Grant
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