

# Green Infrastructure Champions Program

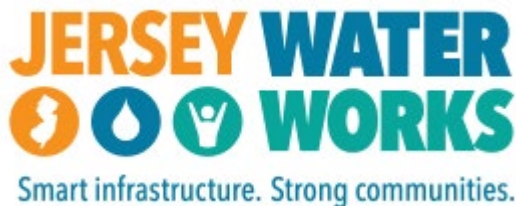
*This program is partially funded by the Rutgers New Jersey Agricultural Experiment Station, The Geraldine R. Dodge Foundation, NJ Sea Grant Consortium, The William Penn Foundation and is a collaboration of the Rutgers Cooperative Extension Water Resources Program and the Green Infrastructure Subcommittee of Jersey Water Works.*



**Please enter your full name and affiliation in the chat. This is how will take attendance.**



IMAGINE A BETTER NEW JERSEY



# Green Infrastructure Champion Training: Part 9

## **“Developing Green Infrastructure Masterplans for Entire Sites, Neighborhoods, and Townships”**

Virtual Class  
May 6, 2022





# What is a Master Plan?

- Provides a framework for future growth
- Looks at the bigger picture
  - Interactive
  - Showcase collaboration
- Supports the value of an engineering, planning, and landscape architecture partnership
  - Multidisciplinary
  - Environmentally focused



# Typical Master Plan Elements

- Public participation/visioning
- Land use/zoning
- Circulation/Transportation
- Environmental planning
- Economic development planning
- Historic preservation
- Infrastructure planning
- Parks, recreation and open space
- Community facilities
- Urban design
- Regional planning
- Sustainability/resiliency
- Redevelopment



# Landscape Master Plan

Integrates the landscape elements of a site master plan

- Transportation/Circulation
- Vegetation
- Environmental Resources
- Recreational Spaces
- Cultural/Historic Resources
- Scenic Viewpoints
- Points of Interest / Attractions
- Stormwater Management
- Green Infrastructure





# Stormwater Management / Green Infrastructure Master Plan

## Highlights stormwater management elements of a site master plan

- Retrofitting existing sites for green infrastructure
- Reducing impervious cover
- Recommended locations for the maximum possible green infrastructure opportunities



# Expanding the Focus of Green Infrastructure Master Planning

## Integrating multiple master plan elements

- Stormwater Management/Green Infrastructure
- Landscape Elements
- Sustainability Element
- Placemaking



# Why expand the focus?

- Enhance people/environment interaction
  - Accessibility
  - Education
  - Stewardship
- Collaborate across professional disciplines and community interests
- Align existing planning efforts to promote efficiency
- Provide a framework for future growth





# Master Plan Scales

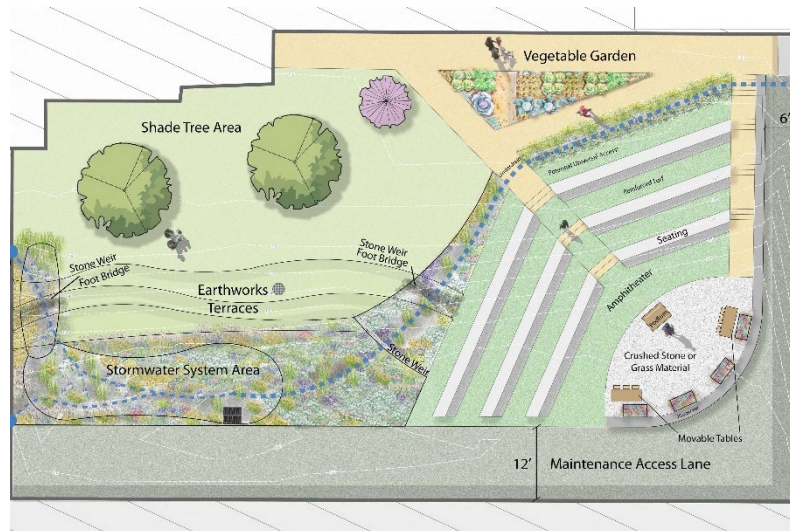


Image Credit: Congress for New Urbanism

Town



Neighborhood



Site

# Components

## Places – Home - Destinations – “Nodes”

### Small

- residences
- playgrounds
- pocket parks,
- urban sites
- vacant lots to be reused
- schools w/out land
- small historic sites
- detention basins
- lakes/ponds

### Large

- Neighborhoods
- parks
- school campuses
- municipal complexes
- historic sites
- cemeteries
- corporate parks
- business parks
- shopping areas, etc.



# Components

## Connections - Streets – Paths – Streams – “Corridors”

- Streets (especially wide streets)
- rails to trails
- linear parks
- river/floodplain parks
- stream corridors
- linear parks (e.g. D & R Canal)
- aggregated vacant lands
- infrastructure corridors (wide highway ROWs, rail line ROWs, powerline/ pipeline ROWs)
- historical corridors/trails
- waterfronts

# Project Example: Hillsborough

**Draft**

**Impervious Cover Reduction Action Plan  
for  
Hillsborough Township, Somerset County, New Jersey**

*Prepared for Hillsborough Township by the  
Rutgers Cooperative Extension Water Resources Program*

September 5, 2015



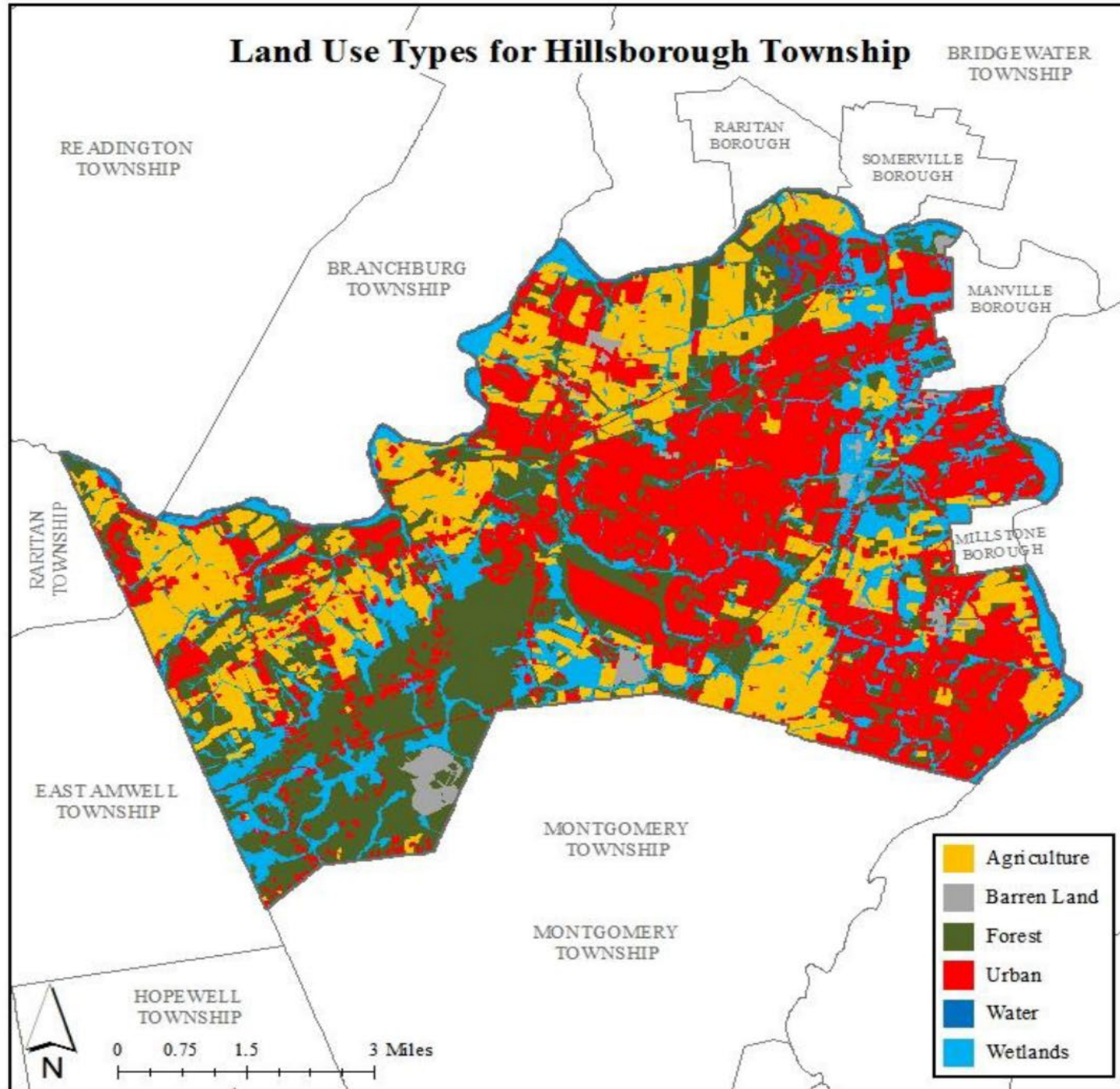


Figure 1: Map illustrating the land use in Hillsborough Township



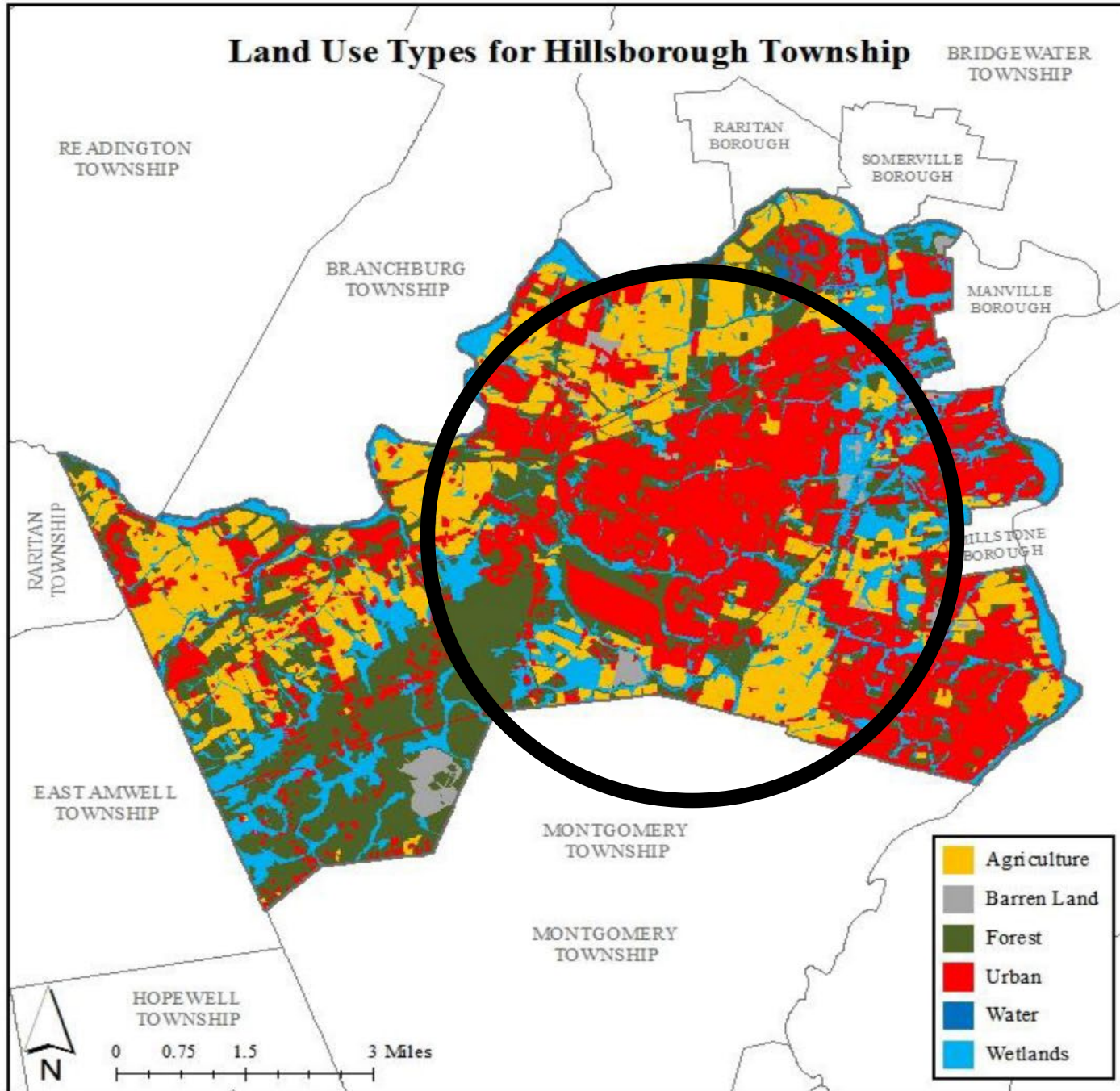
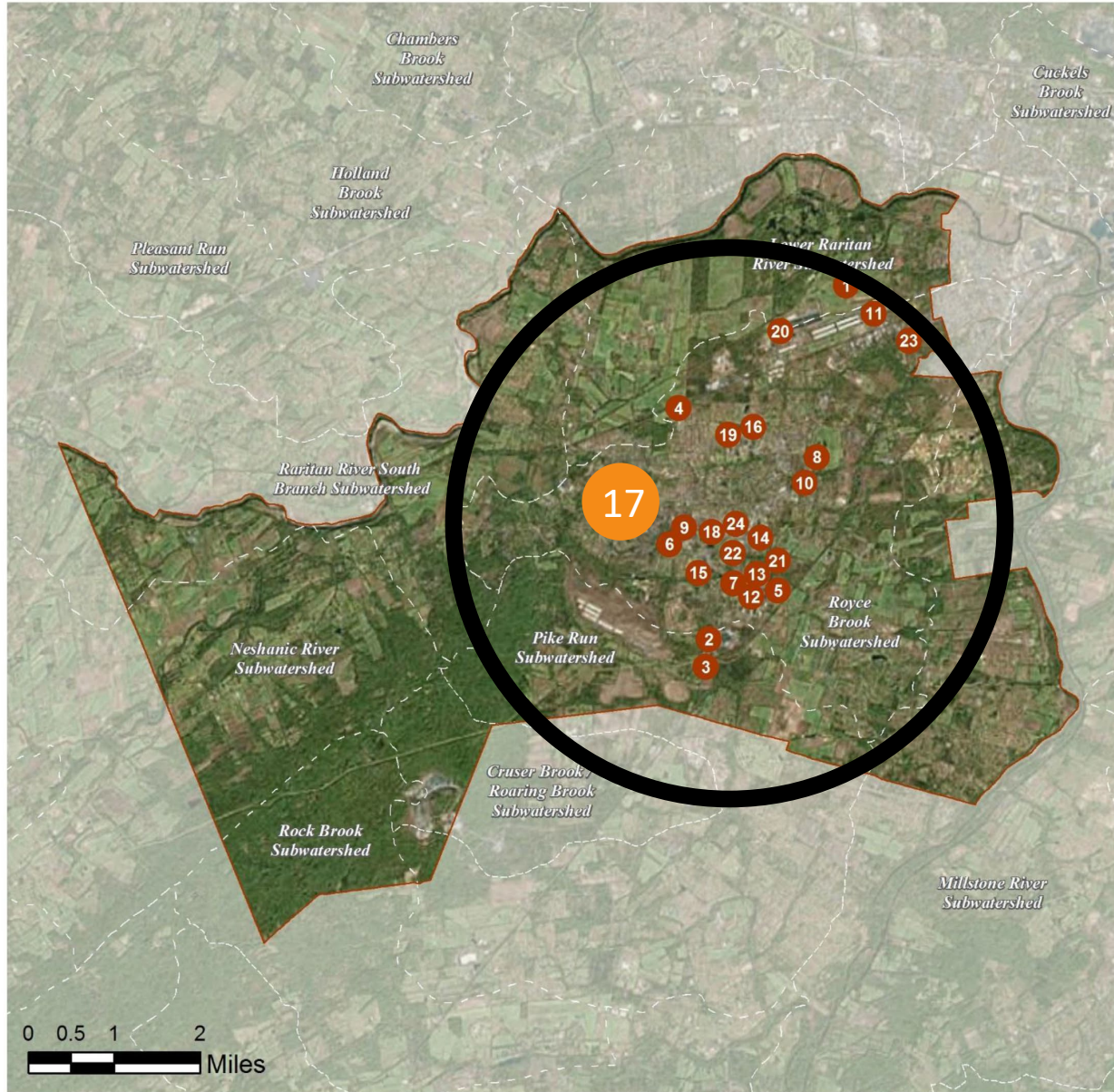


Figure 1: Map illustrating the land use in Hillsborough Township

# HILLSBOROUGH: GREEN INFRASTRUCTURE SITES



## SITES WITHIN THE LOWER RARITAN RIVER SUBWATERSHED:

1. Duke Farms: Cottages

## SITES WITHIN THE PIKE RUN SUBWATERSHED:

2. Hillsborough Star Diner
3. Mountain View Plaza

## SITES WITHIN THE ROYCE BROOK SUBWATERSHED:

4. Auten Road School
5. Boro Kid Zone
6. Claremont Towers
7. Corporate Building
8. Doctors Way Offices
9. Eves Drive
10. Fire Department and Radiology
11. Harold Docherty Memorial Park
12. Hillsborough Business Center: Building 29
13. Hillsborough Business Center: Building 30
14. Hillsborough Center
15. Hillsborough High School
16. Hillsborough Middle School and Triangle Elementary School
17. Hillsborough Municipal Building and Library
18. JK Design
19. Mary Mother of God Church
20. Paramount Gymnastics
21. R C Fine Foods Inc.
22. Shopping Complex of Amwell
23. Sunnymead Elementary
24. US Post Office



# HILLSBOROUGH MUNICIPAL BUILDING AND LIBRARY



**Subwatershed:** Royce Brook  
**Site Area:** 1,397,452 sq. ft.  
**Address:** 379 South Branch Road  
Hillsborough, NJ 08844  
**Block and Lot:** Block 149, Lot 1.02



Rain gardens can capture, treat, and infiltrate runoff from the parking lots. Additional stormwater can be infiltrated with pervious pavement. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
22	304,677	14.7	153.9	1,398.9	0.237	8.36






Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.610	102	45,217	1.70	5,920	\$29,600
Pervious pavements	0.998	167	73,902	2.78	6,950	\$173,750



# GREEN INFRASTRUCTURE RECOMMENDATIONS



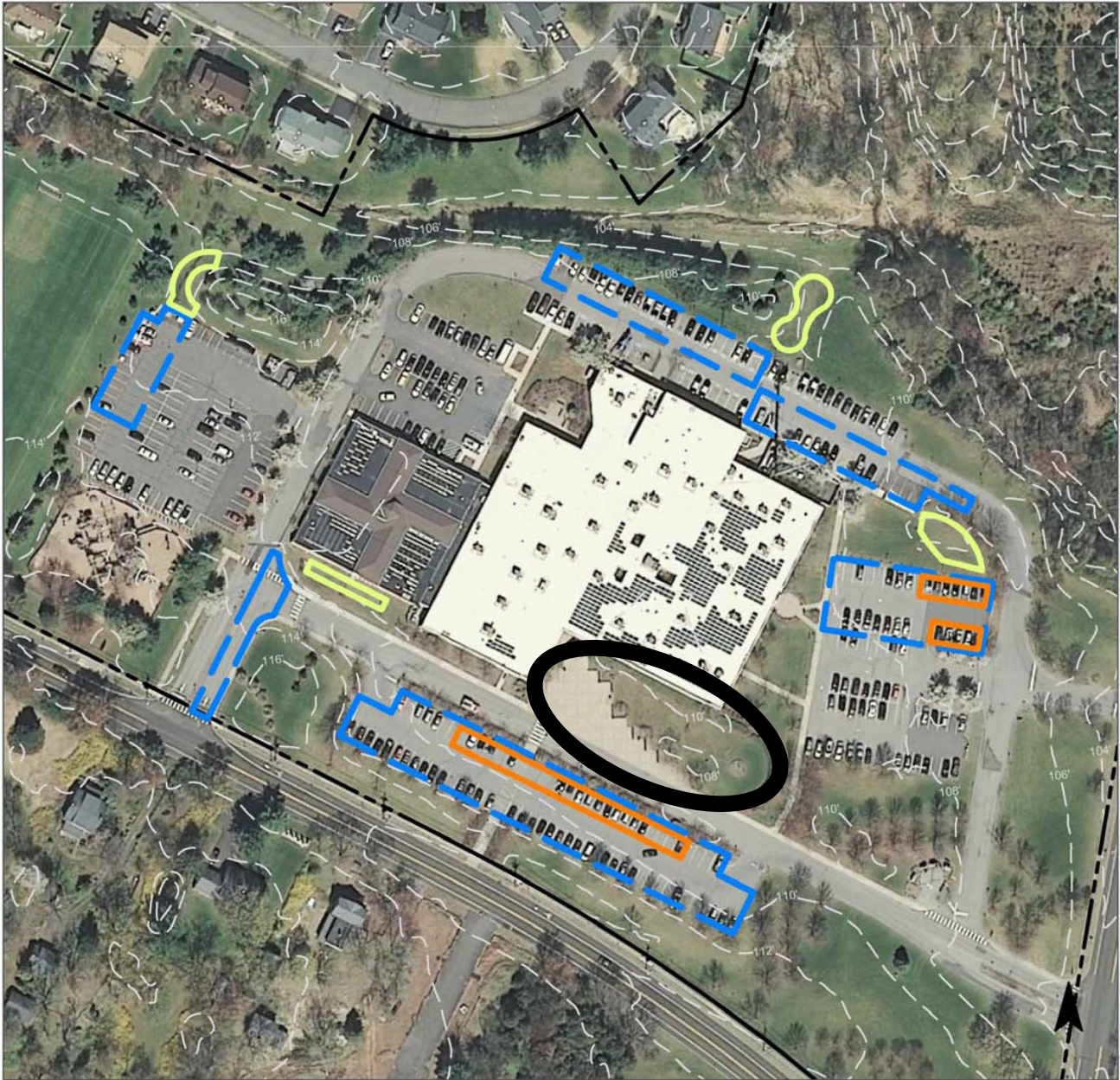
## Hillsborough Municipal Building and Library

-  pervious pavements
-  bioretention / rain gardens
-  drainage areas
-  property line
-  2012 Aerial: NJOIT, OGIS





# GREEN INFRASTRUCTURE RECOMMENDATIONS



## Hillsborough Municipal Building and Library

-  pervious pavements
-  bioretention / rain gardens
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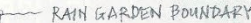





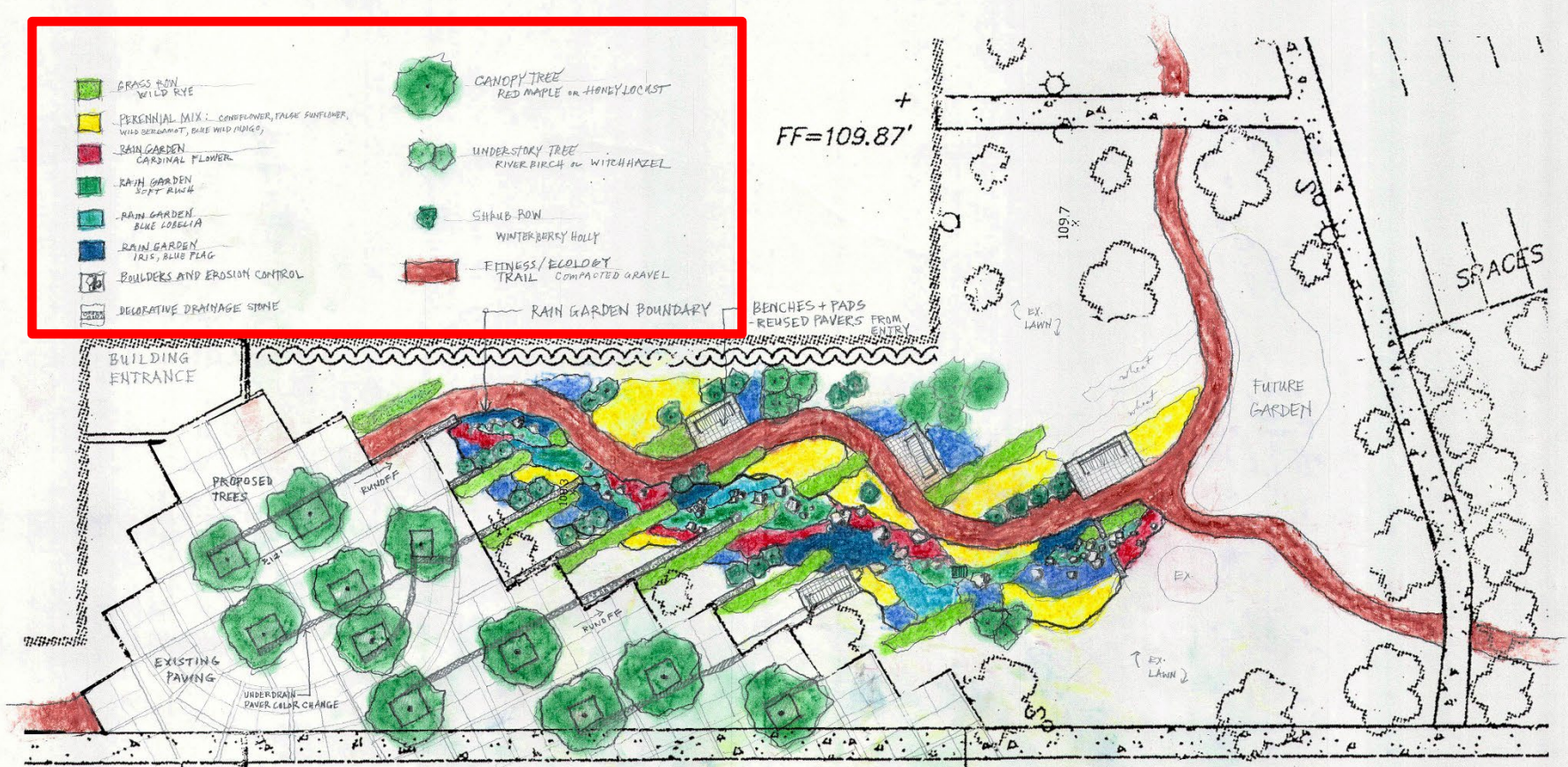






# Hillsborough Municipal Complex Rain Garden Concept Plan

- |   |   |
|---|---|
|  GRASS MIX<br>WILD RYE   |  CANOPY TREE<br>RED MAPLE OR HONEYLOCUST       |
|  PERENNIAL MIX: CONFLOWER, TALL SUNFLOWER,<br>WILD BERGAMOT, BLUE WILD THING |  UNDERSTORY TREE<br>RIVER BIRCH OR WITCH HAZEL |
|  RAIN GARDEN<br>CARDINAL FLOWER  |  SHAUB POW<br>WINTER BERRY HOLLY               |
|  RAIN GARDEN<br>SOFT RING  |  FITNESS/ECOLOGY<br>TRAIL<br>COMPACTED GRAVEL  |
|  RAIN GARDEN<br>BLUE LOBELIA   |  RAIN GARDEN BOUNDARY                          |
|  RAIN GARDEN<br>IRIS, BLUE FLAG  |   |
|  BUILDERS AND EROSION CONTROL  |   |
|  DECORATIVE DRAINAGE STONE   |   |



HILLSBOROUGH MUNICIPAL BUILDING  
RAIN GARDEN CONCEPT PLAN

1" = 10'  
RUTGERS  
COOPERATIVE EXTENSION  
APRIL 2016



# Rain Garden Concept Plan Legend



GRASS ROW  
WILD RYE



PERENNIAL MIX: CONEFLOWER, FALSE SUNFLOWER,  
WILD BERGAMOT, BLUE WILD INDIGO,



RAIN GARDEN  
CARDINAL FLOWER



RAIN GARDEN  
SOFT RUSH



RAIN GARDEN  
BLUE LOBELIA



RAIN GARDEN  
IRIS, BLUE FLAG



BOULDERS AND EROSION CONTROL



DECORATIVE DRAINAGE STONE



CANOPY TREE  
RED MAPLE OR HONEYLOCUST



UNDERSTORY TREE  
RIVER BIRCH or WITCHHAZEL



SHRUB ROW  
WINTERBERRY HOLLY



FITNESS/ECOLOGY  
TRAIL COMPACTED GRAVEL

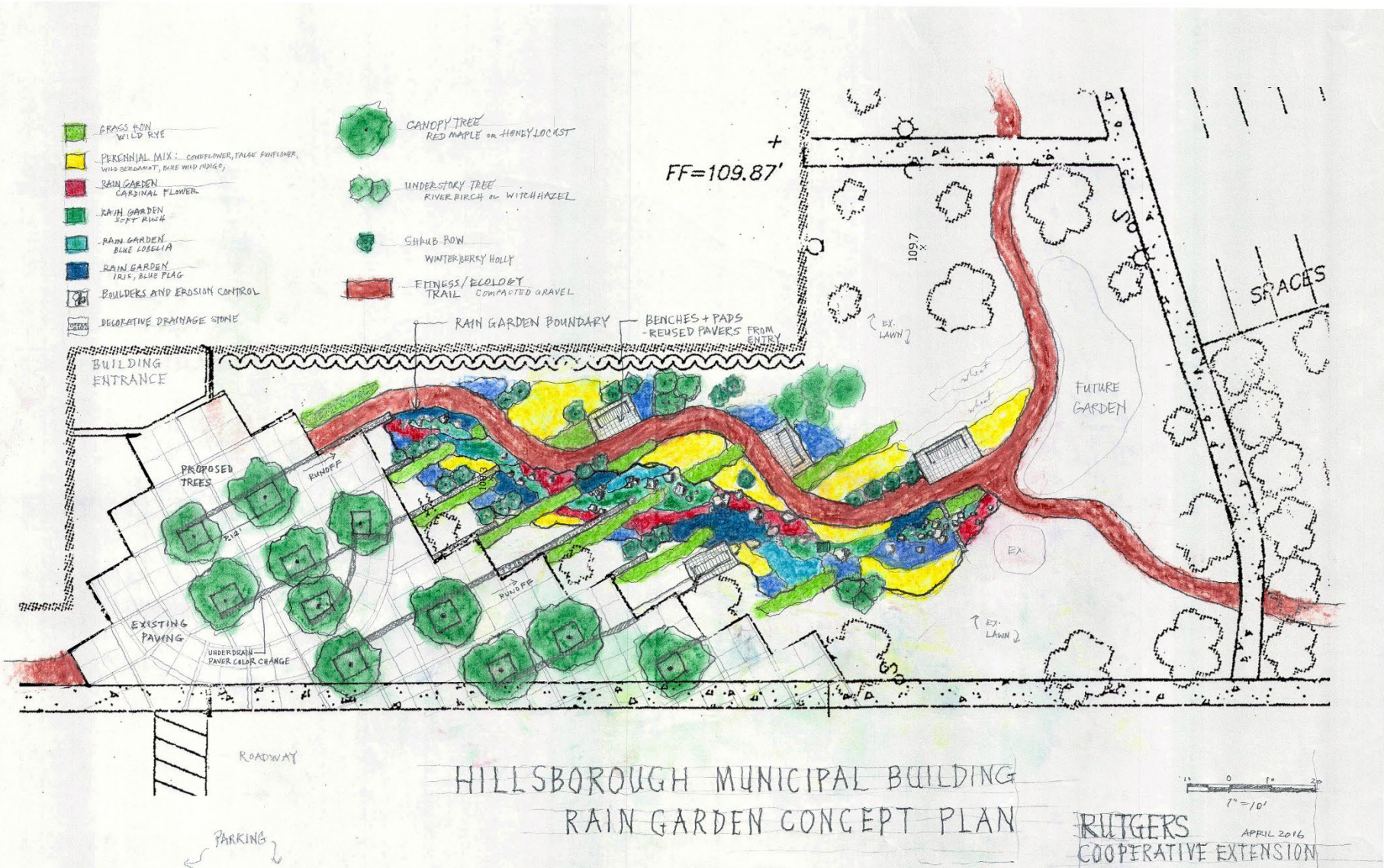
RAIN GARDEN BOUNDARY



BUILDING



# Hillsborough Municipal Complex Rain Garden Plan





# Hillsborough Municipal Complex Sustainability Master Plan

## Expanding the Scope



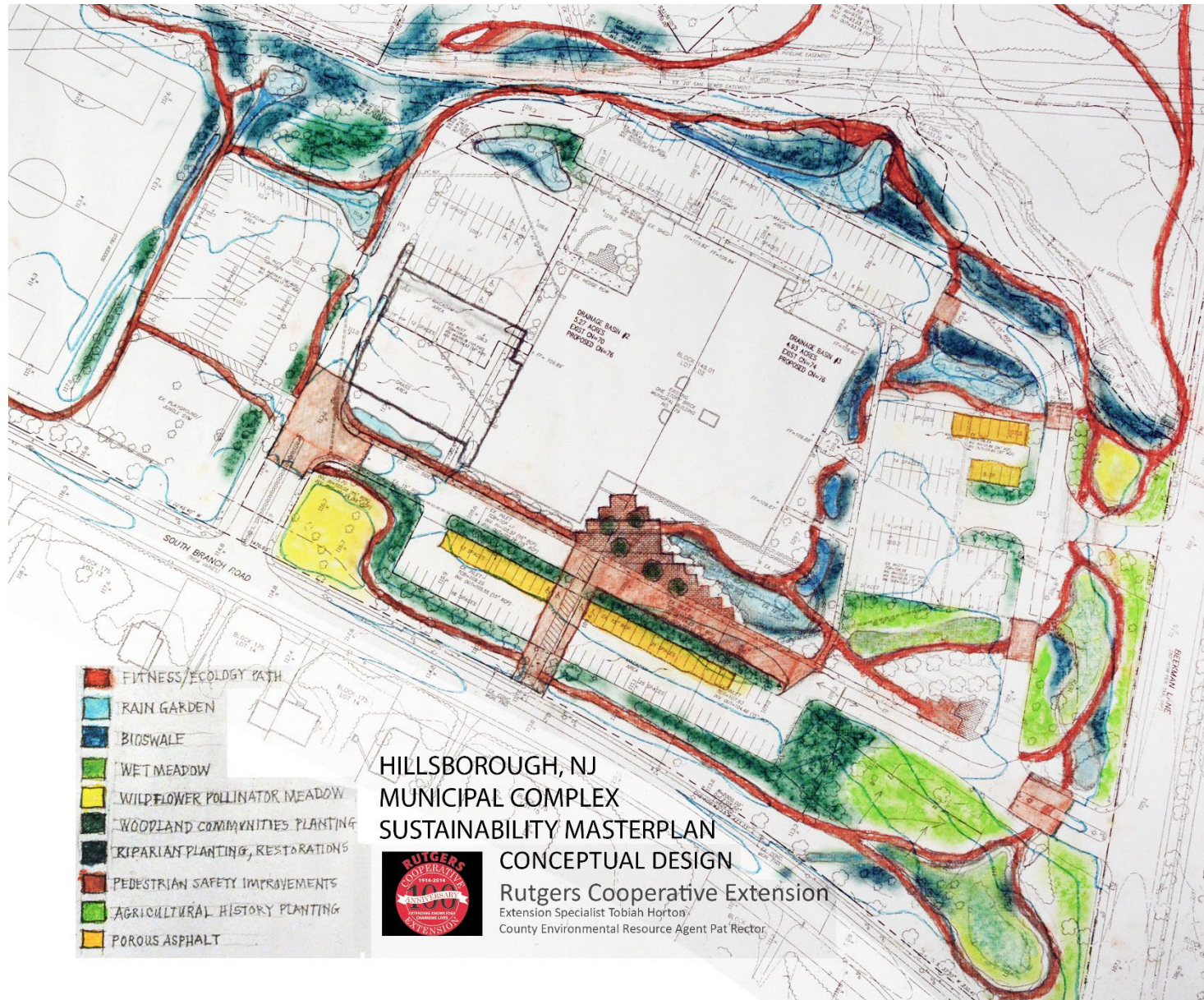
# Master Plan Legend





# Hillsborough Municipal Complex Sustainability Master Plan

## Expanding the Scope





# Conceptual Rendering





# Construction





Season 1





Season 2








10/12/2018



# GREEN INFRASTRUCTURE RECOMMENDATIONS



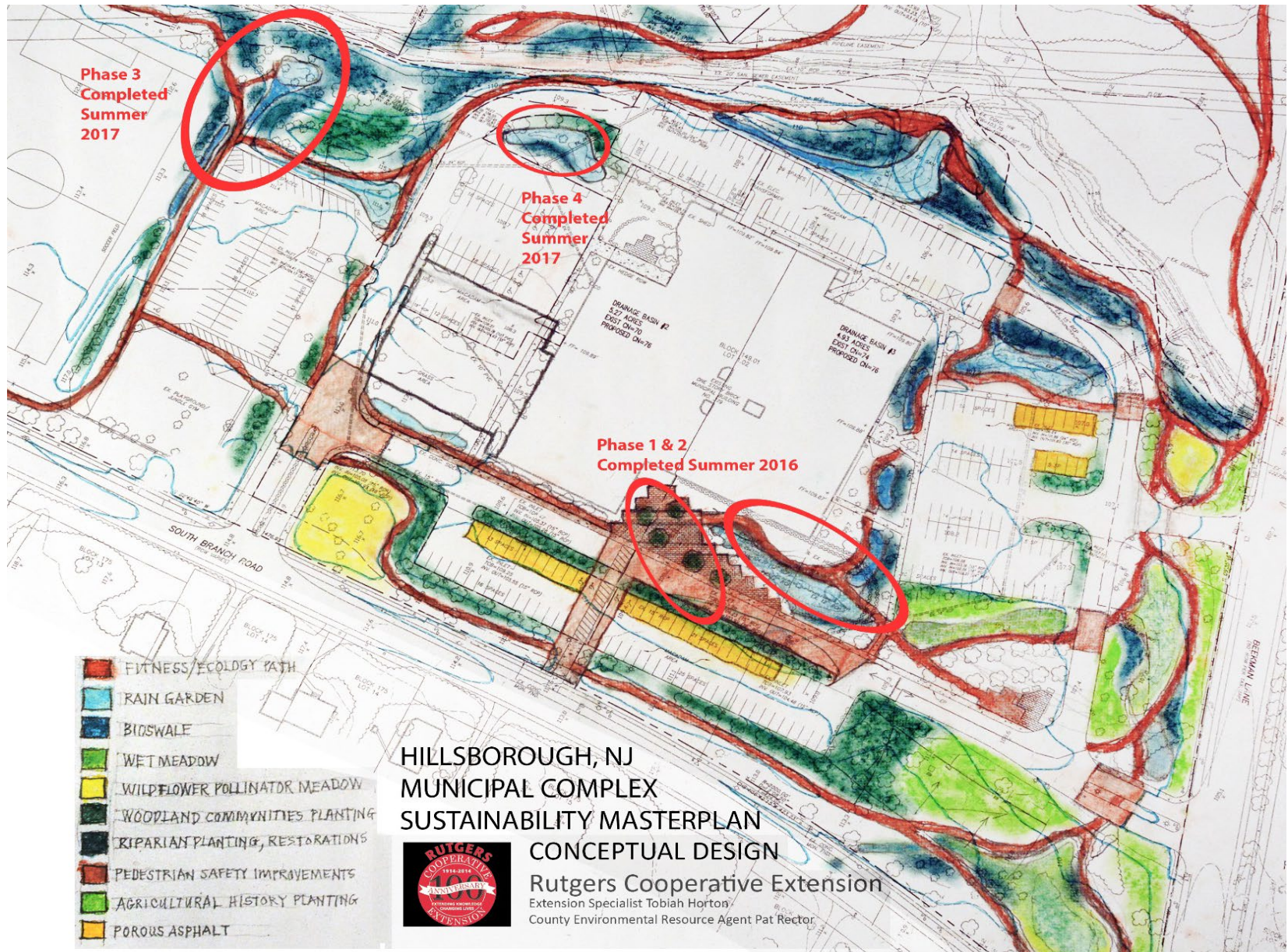
## Hillsborough Municipal Building and Library

-  pervious pavements
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# Hillsborough Municipal Complex Sustainability Master Plan Phasing Plan





# Phase 2 of the Hillsborough Municipal Complex Landscape Sustainability Master Plan





# Phase 2 of the Hillsborough Municipal Complex Landscape Sustainability Master Plan

Paths to nowhere?



On to the next project...







# Hillsborough Municipal Complex Landscape Sustainability Master Plan Eagle Scout Project





# Hillsborough Municipal Complex Sustainability Master Plan

## Phase 3

- Bioswale
- Rain garden
- Walking path







**Existing Conditions**





**Conceptual Rendering**

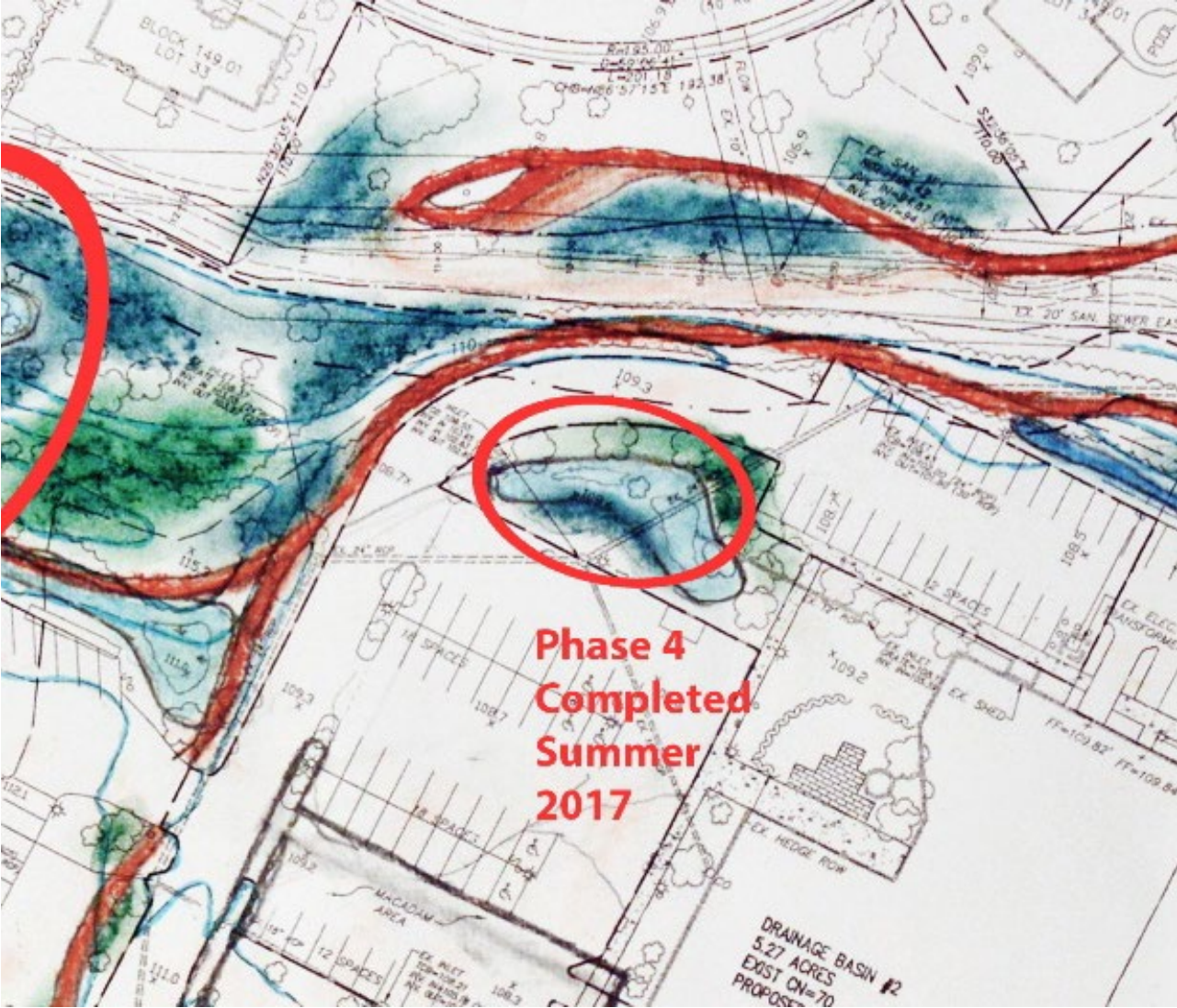




**Post-installation**



# Phase 4 of the Hillsborough Municipal Complex Landscape Sustainability Master Plan





# Hillsborough Municipal Complex Landscape Sustainability Master Plan Pollinator Garden, Girl Scout Gold Award Project





# Hillsborough Municipal Complex Landscape Sustainability Master Plan Pollinator Garden, Girl Scout Gold Award Project



## Pollinators

Their importance to our world

### What is a Pollinator?

Pollinators are vital to most of our food production in America. Pollinators can be bees, butterflies, and even birds. These animals are solely responsible for the reproduction of many of our favorite foods and recently, they have been on rapid decline. In order to stop this decline and witness an upward trend in their population, gardens like these can be made to provide another breeding and pollination stop for these crucial creatures. Making a difference towards this movement is not hard, just one plant could be enough to help hundreds of bees and butterflies!

### What is in this Garden?

This assortment of flowers are just some of the many that attract and accommodate pollinators. The major plants you see here include: Butterfly Bush, Babes, Geranium, Catnip, Lavender, Marigold, Aster, Thyme, Yarrow, and Coneflower. You also see a collection of rocks in the middle which serve as a sort of "bee cave" where they can be in a shaded area; bees also enjoy the moisture that collects on bare dirt which surrounds the rocks. The hummingbird feeder is to attract some flighted friends as well!

### How can YOU Help?

Installing just one of these plants into your yard at home is enough to make a difference to pollinators in our community. Local garden centers are just as invested in this cause and are more than happy to help you pick the perfect plant for your pollinator project!

This pollinator garden was donated to Hillsborough Township as the Girl Scout Gold Award Project of Brynne Briegs. Thank you to these sponsors for making this project possible!





## Pollinators

### Their importance to our world

**What is a Pollinator?**  
 Insects are one of the most important to America. Without them to pollinate, our food supply would be severely impacted. In fact, 75% of the food we eat depends on pollinators. The most common pollinators are bees, but other insects like butterflies, moths, and beetles also play a role. The honey bee is the most important pollinator for our food supply. They are responsible for pollinating a wide variety of crops, including fruits, vegetables, and nuts. Without them, our food supply would be severely impacted.

**What is in this Garden?**  
 This garden is designed to attract and support a variety of pollinators. It features a mix of native and non-native plants, including flowers, herbs, and shrubs. The plants are chosen for their ability to attract and support a wide variety of pollinators, including bees, butterflies, and moths. The garden is also designed to provide a safe and healthy habitat for these important insects.

**How can YOU Help?**  
 You can help support pollinators by planting native plants, avoiding pesticides, and providing a safe and healthy habitat for these important insects. You can also help by educating others about the importance of pollinators and the need to protect them.



This pollinator garden was donated by the City of Warren, Michigan, to the City of Warren, Michigan, in honor of the City's 100th Anniversary. The garden is located at the intersection of Warren and Grand Avenues in Warren, Michigan.

Warren Michigan



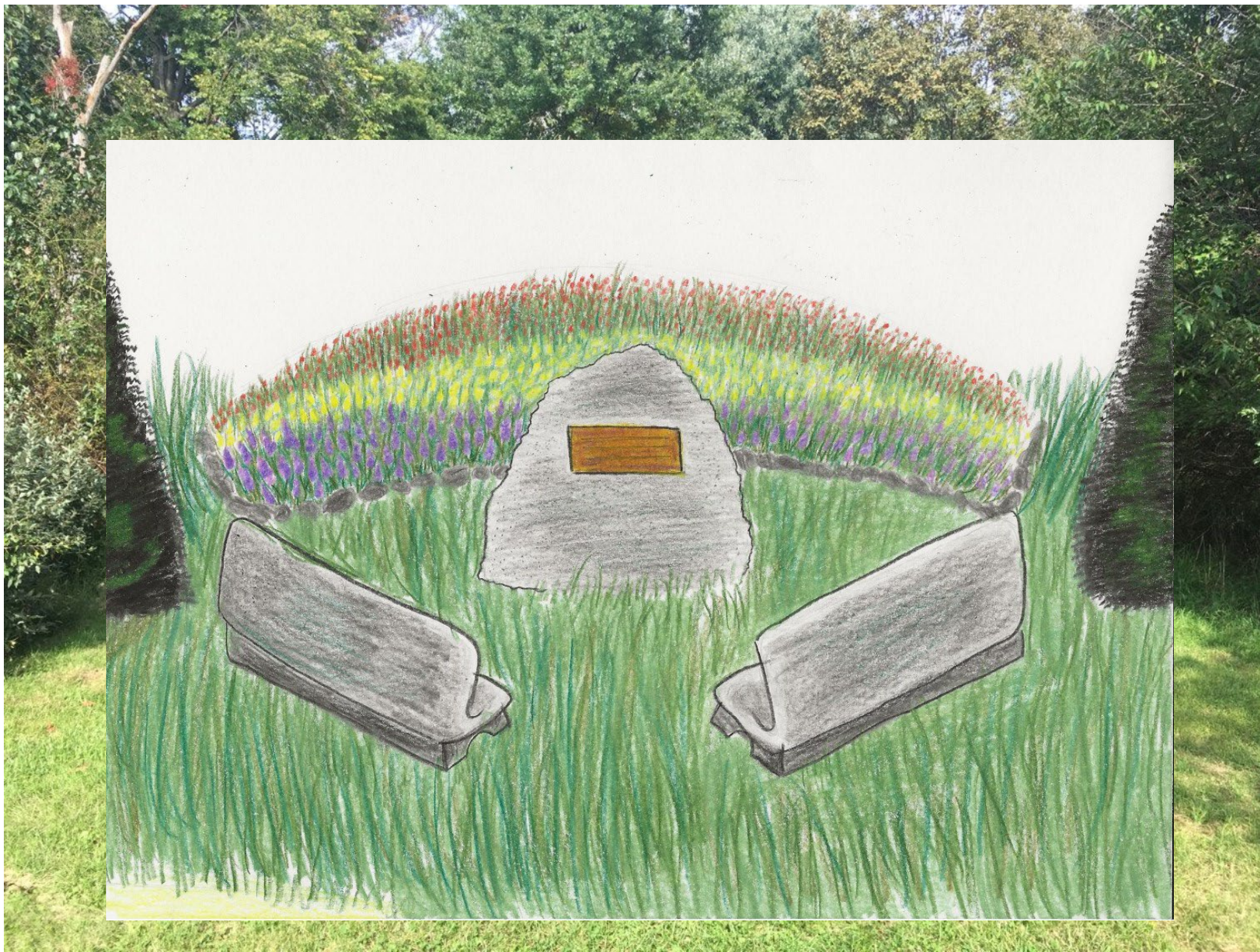
# Hillsborough Municipal Complex Landscape Sustainability Master Plan Future Police Memorial Native Plant Garden





# Hillsborough Municipal Complex Landscape Sustainability Master Plan

## Future Police Memorial Native Plant Garden









# Demonstration Gardens to Full Site Sustainability Master Plans

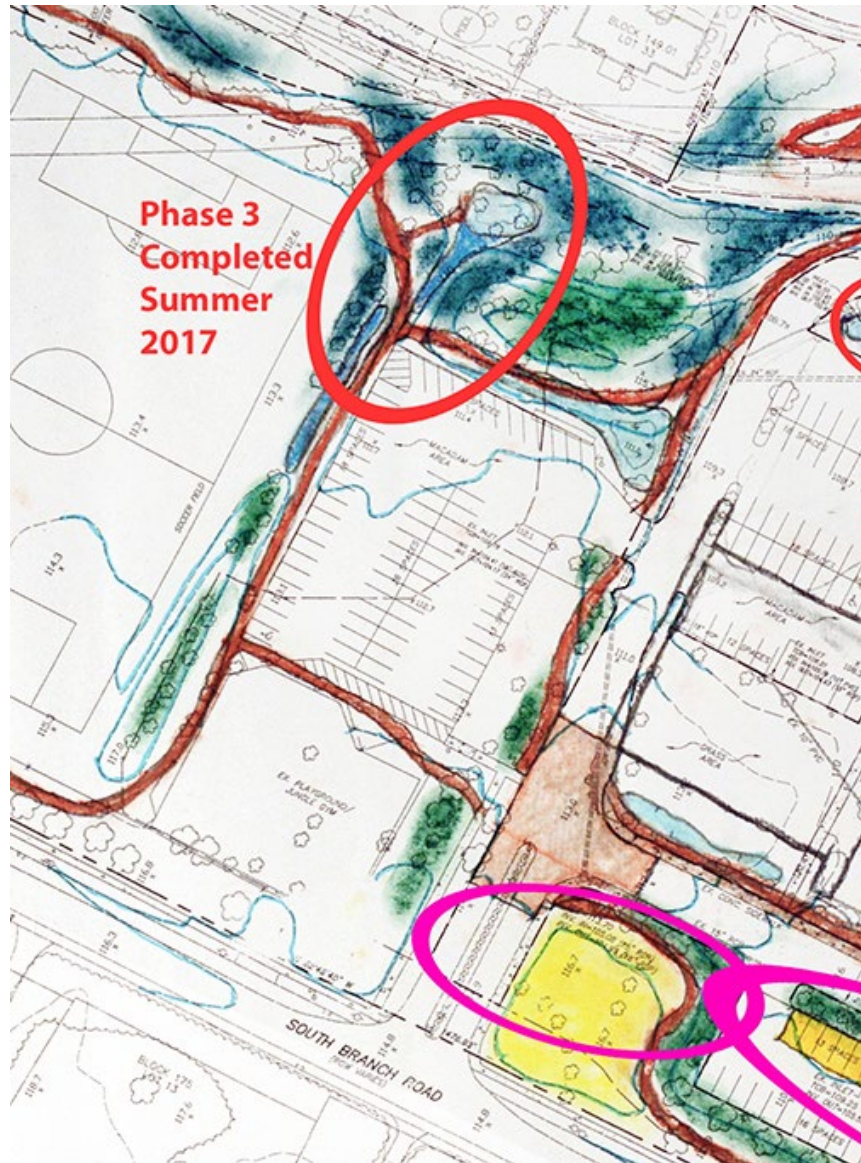




# Demonstration Gardens to Full Site Sustainability Master Plans

## Nature and Fitness Path

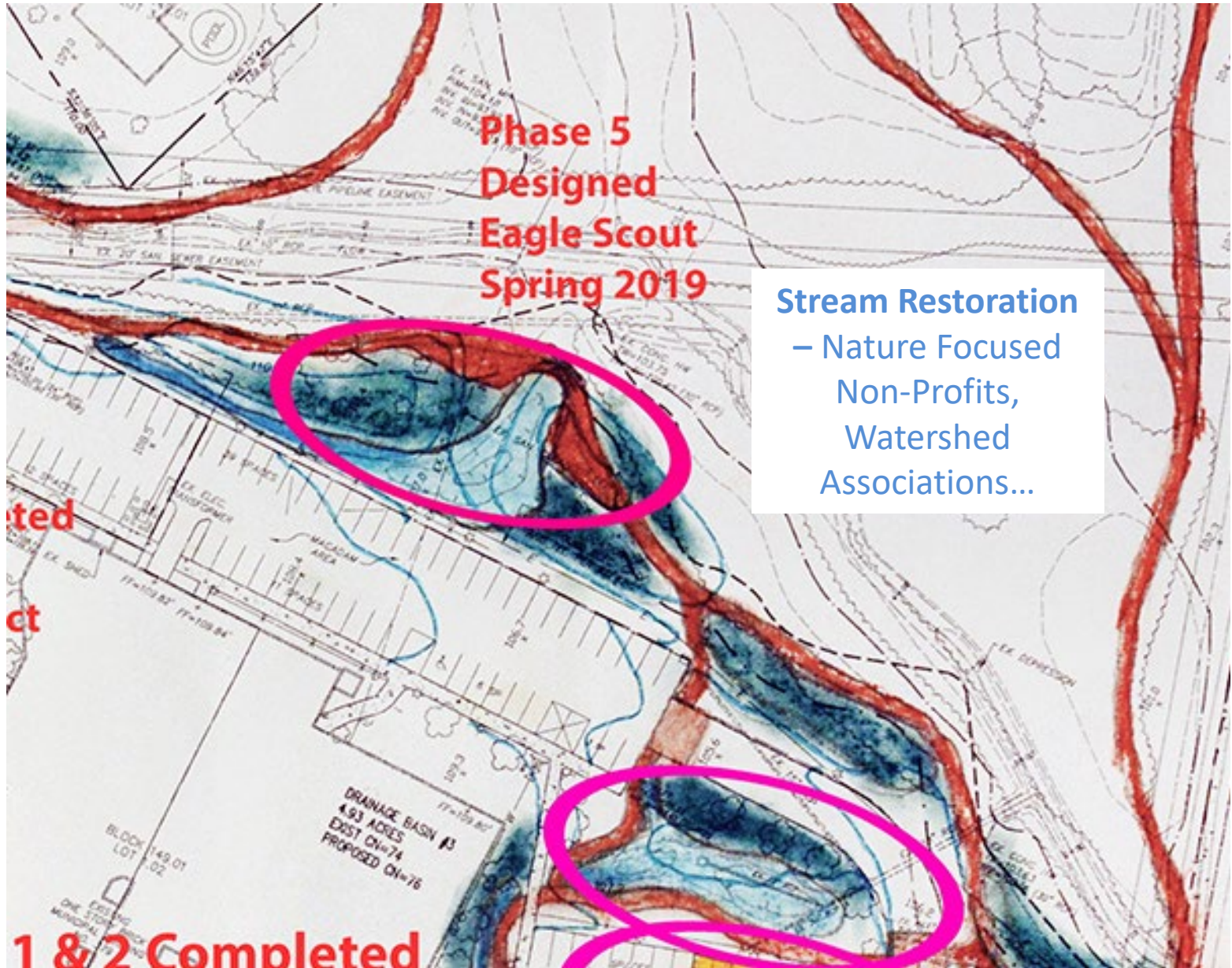
– Health Groups, Insurance Companies, Doctors Associations, etc.



**Pollinator –**  
Master Gardeners, Boy/Girl Scouts, School Science Groups...



# Demonstration Gardens to Full Site Sustainability Master Plans



Phase 5  
Designed  
Eagle Scout  
Spring 2019

Stream Restoration  
– Nature Focused  
Non-Profits,  
Watershed  
Associations...

1 & 2 Completed



# Demonstration Gardens to Full Site Sustainability Master Plans



**Agricultural History Garden** - Historical Society, Local Farm Group, Individual Farmers, Food Non-Profits, Community Gardens...

**Forest Gardens** – Nature Focused Non-Profits, Watershed Associations...



# Demonstration Gardens to Full Site Sustainability Master Plans







**Hillsborough Township**  
Somerset County, New Jersey

**2018 MASTER PLAN REEXAMINATION REPORT**

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*Adopted by the Hillsborough Township Planning Board  
November 29, 2018*

*7. Green Buildings and Environmental Sustainability Plan Element \**

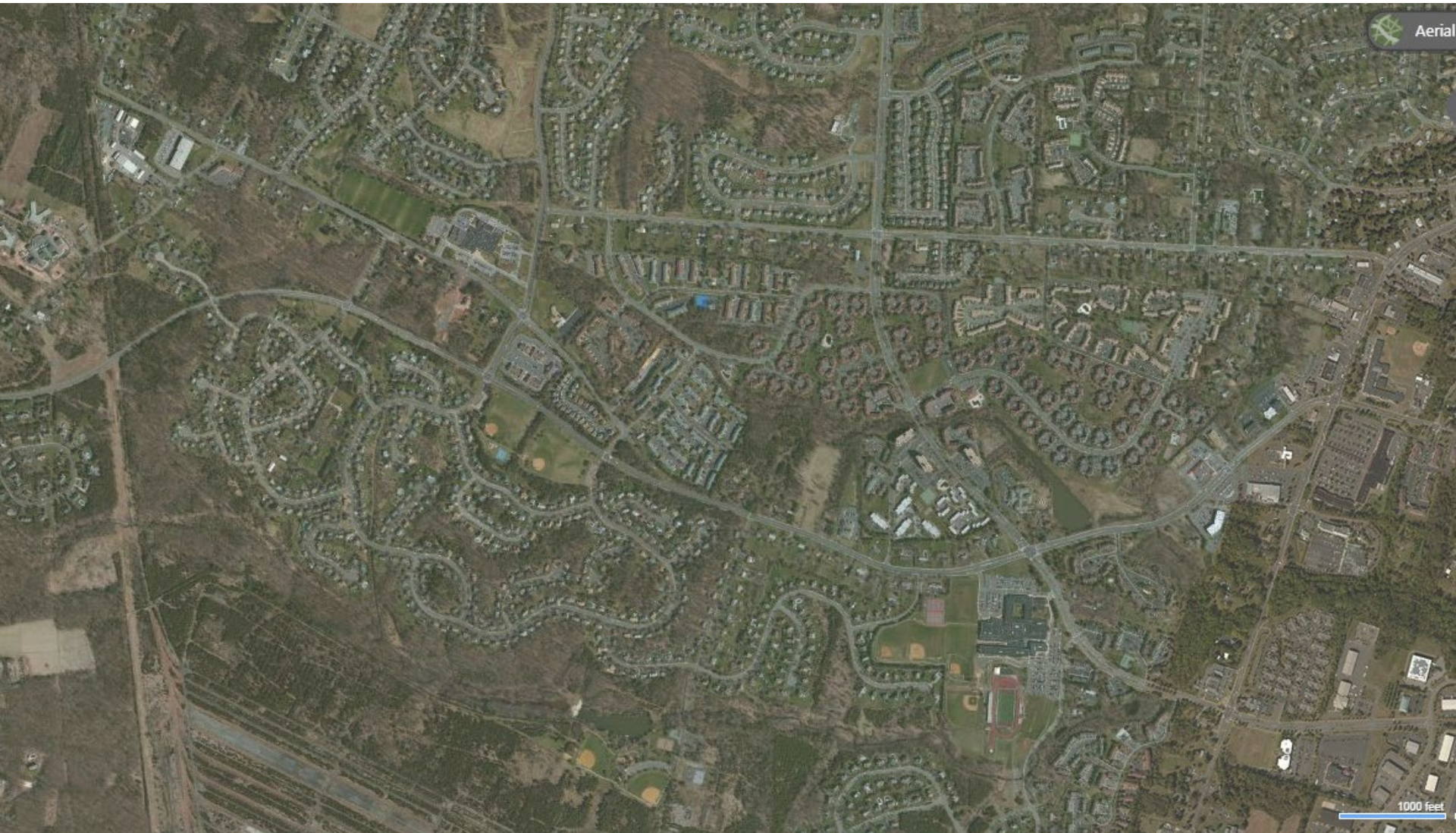
Prepare a Green Buildings and Environmental Sustainability Plan Element. This new element would serve as the basis for incorporating green building and sustainability practices into the Land Use and Development Ordinance.



Break



# Town/Municipal Scale Green Infrastructure Master Plans



Hillsborough, New Jersey



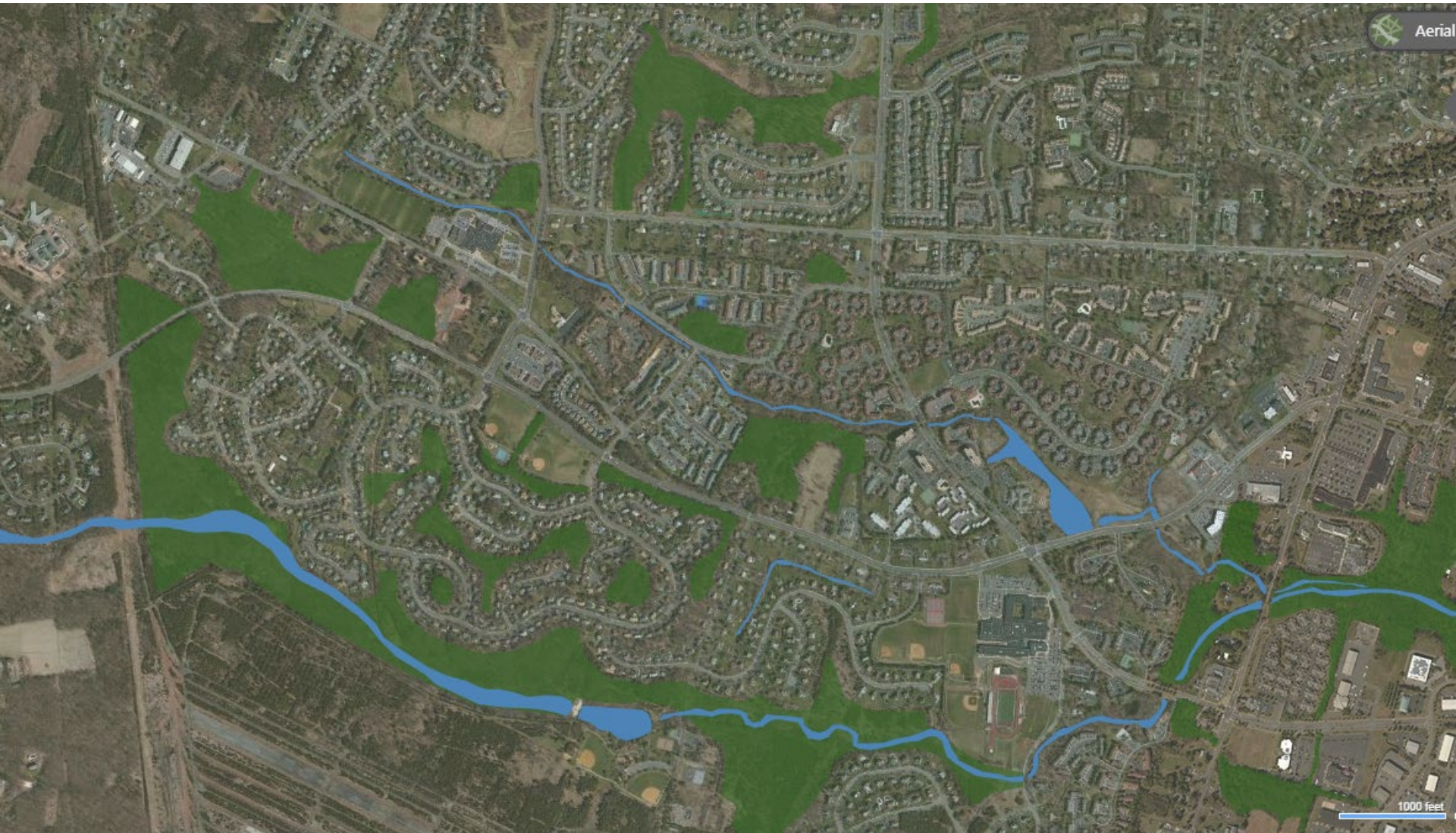
# Town/Municipal Scale Green Infrastructure Master Plans



Dense Tree Cover



# Town/Municipal Scale Green Infrastructure Master Plans



Streams



# Town/Municipal Scale Green Infrastructure Master Plans



Floodplains



# Town/Municipal Scale Green Infrastructure Master Plans



Detention Basins



# Town/Municipal Scale Green Infrastructure Master Plans



Destinations



# Town/Municipal Scale Green Infrastructure Master Plans



Destinations and Origins



# Town/Municipal Scale Green Infrastructure Master Plans



Bike and Pedestrian Paths



# Town/Municipal Scale Green Infrastructure Master Plans



Complete Streets



# Town/Municipal Scale Green Infrastructure Master Plans



Safe Thoroughfares and Intersections

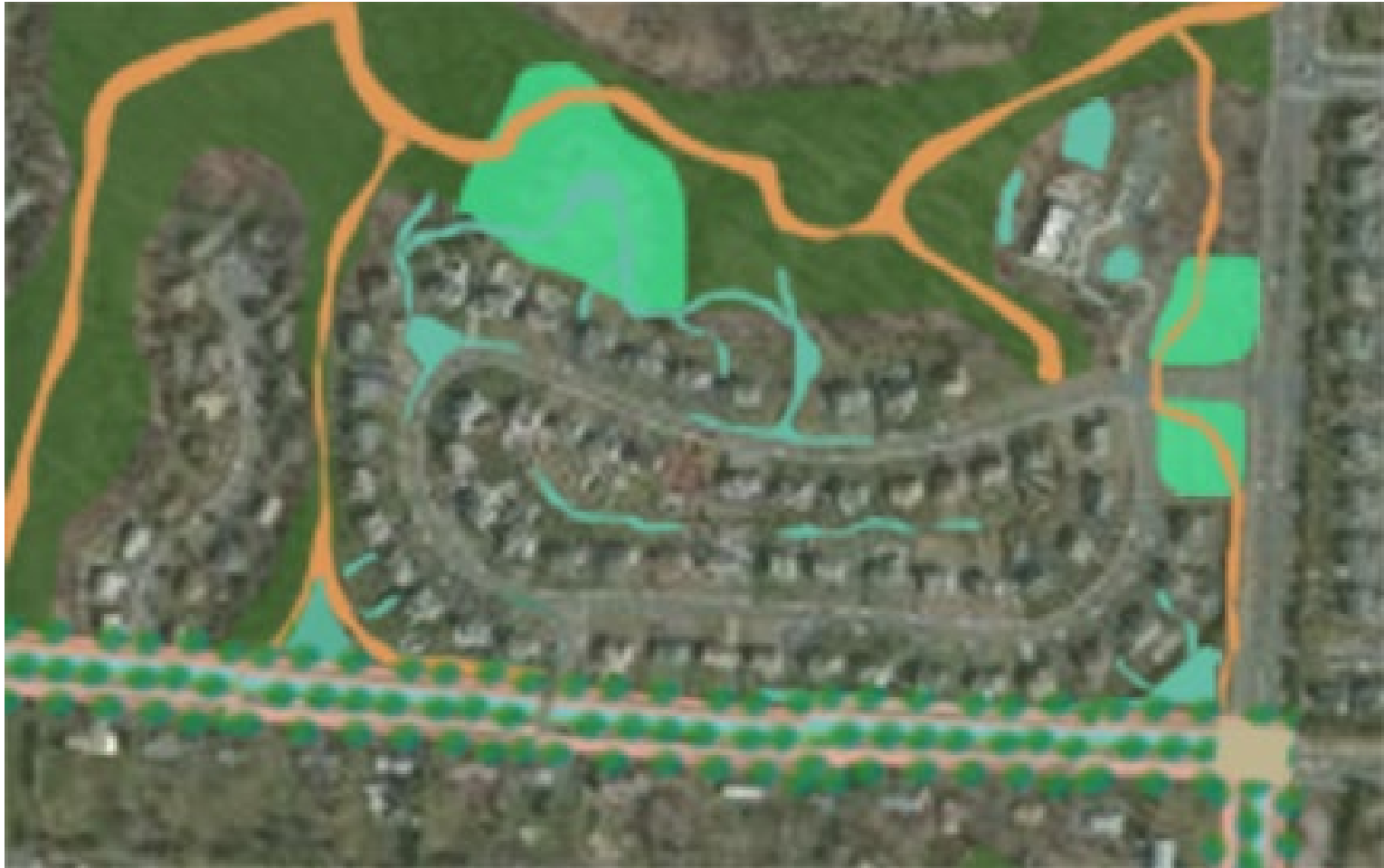


# What Would a Neighborhood Look Like?



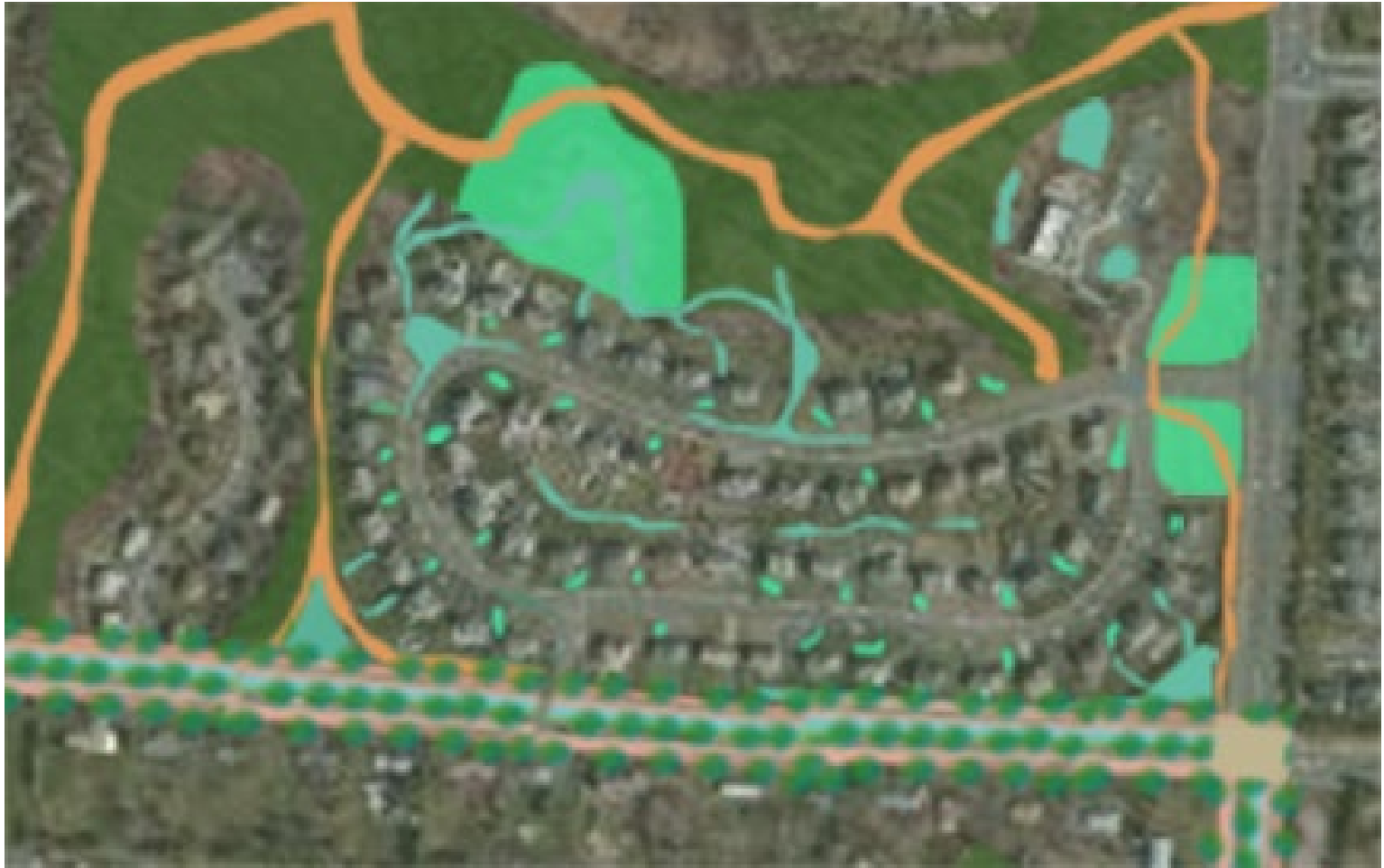


# What Would a Neighborhood Look Like?





# What Would a Neighborhood Look Like?





## What Would a Neighborhood Look Like?





# What Would a Neighborhood Look Like?



- **Green / Complete streets**
- **Rain Gardens**
- **Bioswales**



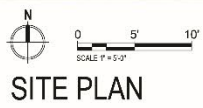
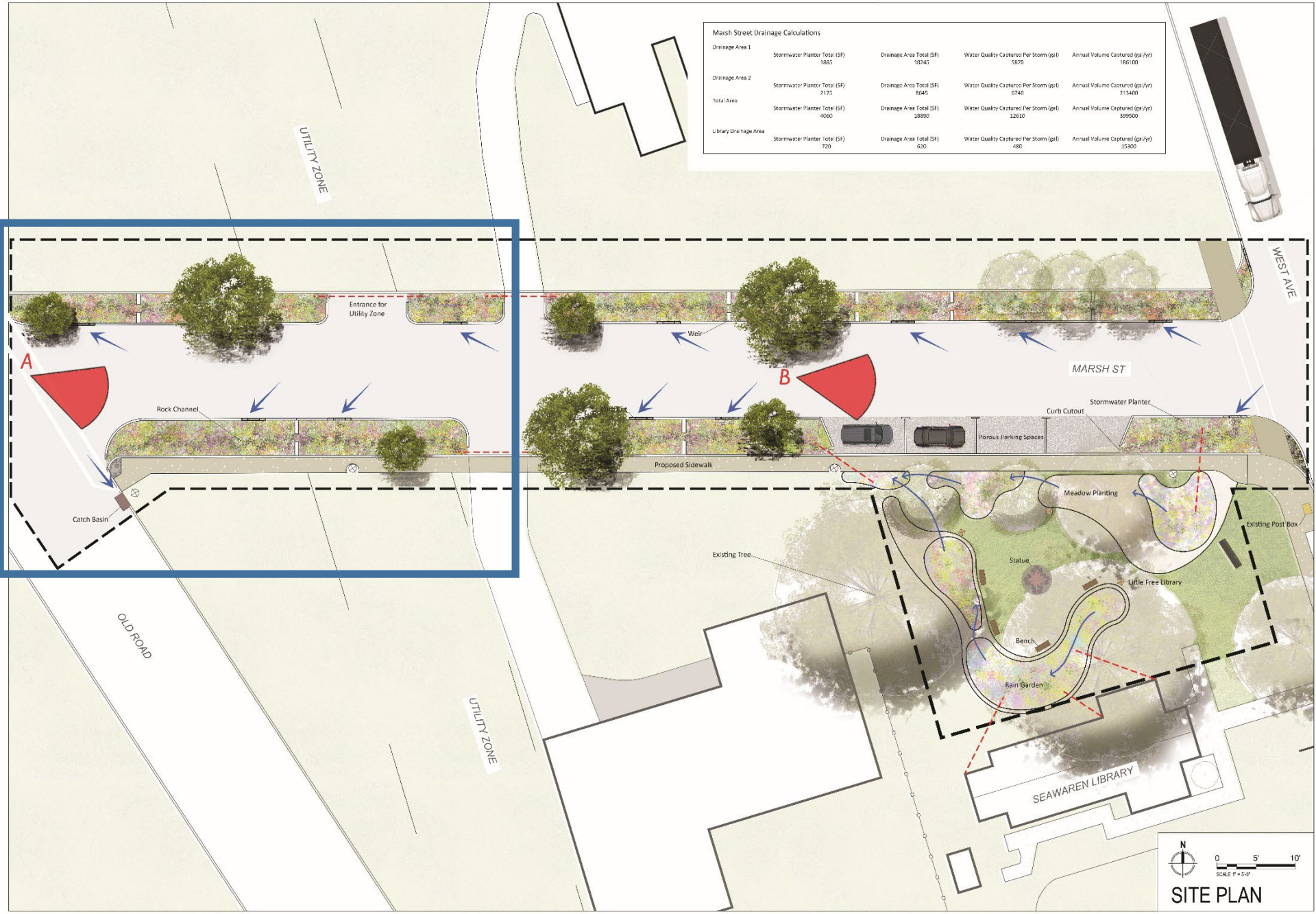
# Project Examples



# Conceptual Plan – Marsh Street, Woodbridge

Marsh Street Drainage Calculations

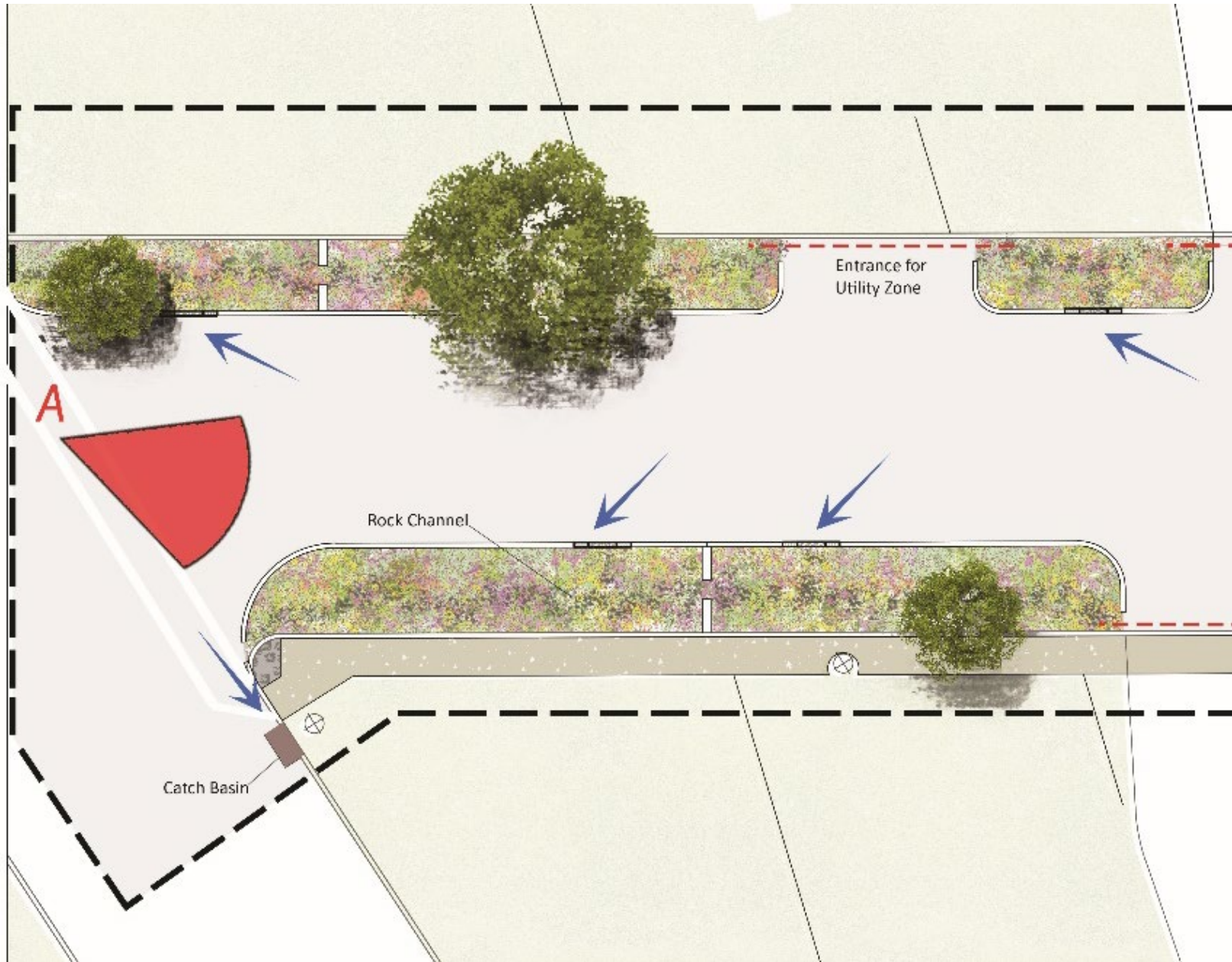
Drainage Area 1	Stormwater Planter Total (SF)	Drainage Area Total (SF)	Water Quality Capture Per Storm (gal)	Annual Volume Captured (ga/yr)
	1885	10745	5670	186100
Drainage Area 2	Stormwater Planter Total (SF)	Drainage Area Total (SF)	Water Quality Capture Per Storm (gal)	Annual Volume Captured (ga/yr)
	2135	8645	6740	213400
Total Area	Stormwater Planter Total (SF)	Drainage Area Total (SF)	Water Quality Capture Per Storm (gal)	Annual Volume Captured (ga/yr)
	4000	18890	12610	399500
Library Drainage Area	Stormwater Planter Total (SF)	Drainage Area Total (SF)	Water Quality Capture Per Storm (gal)	Annual Volume Captured (ga/yr)
	720	620	480	15300



SITE PLAN

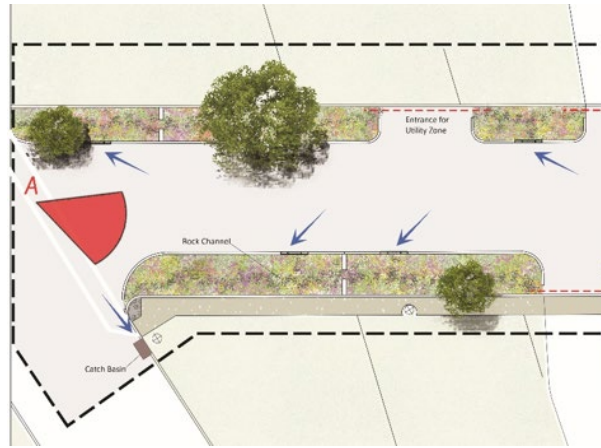


# Conceptual Plan





# Rendering View A

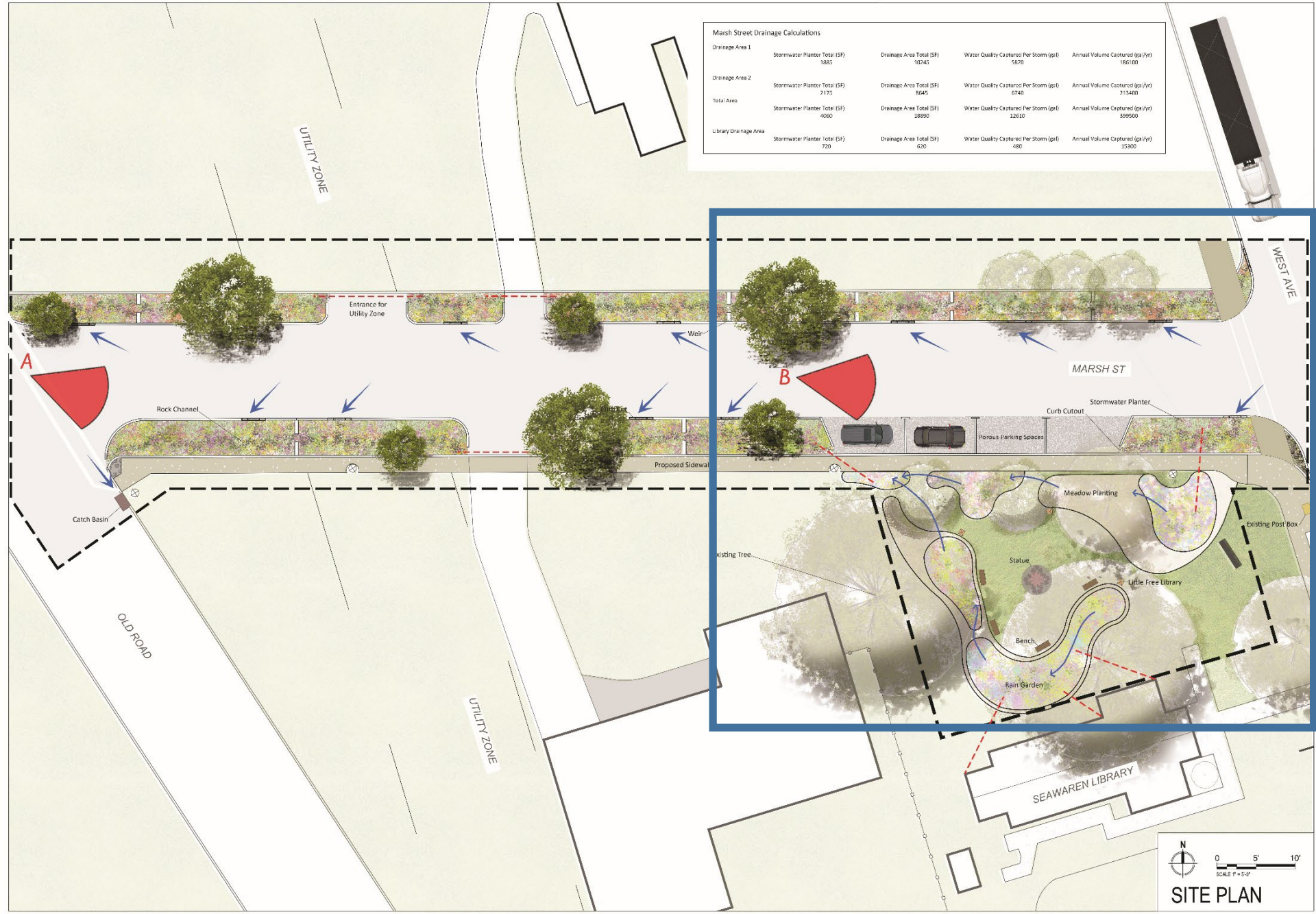




# Conceptual Plan

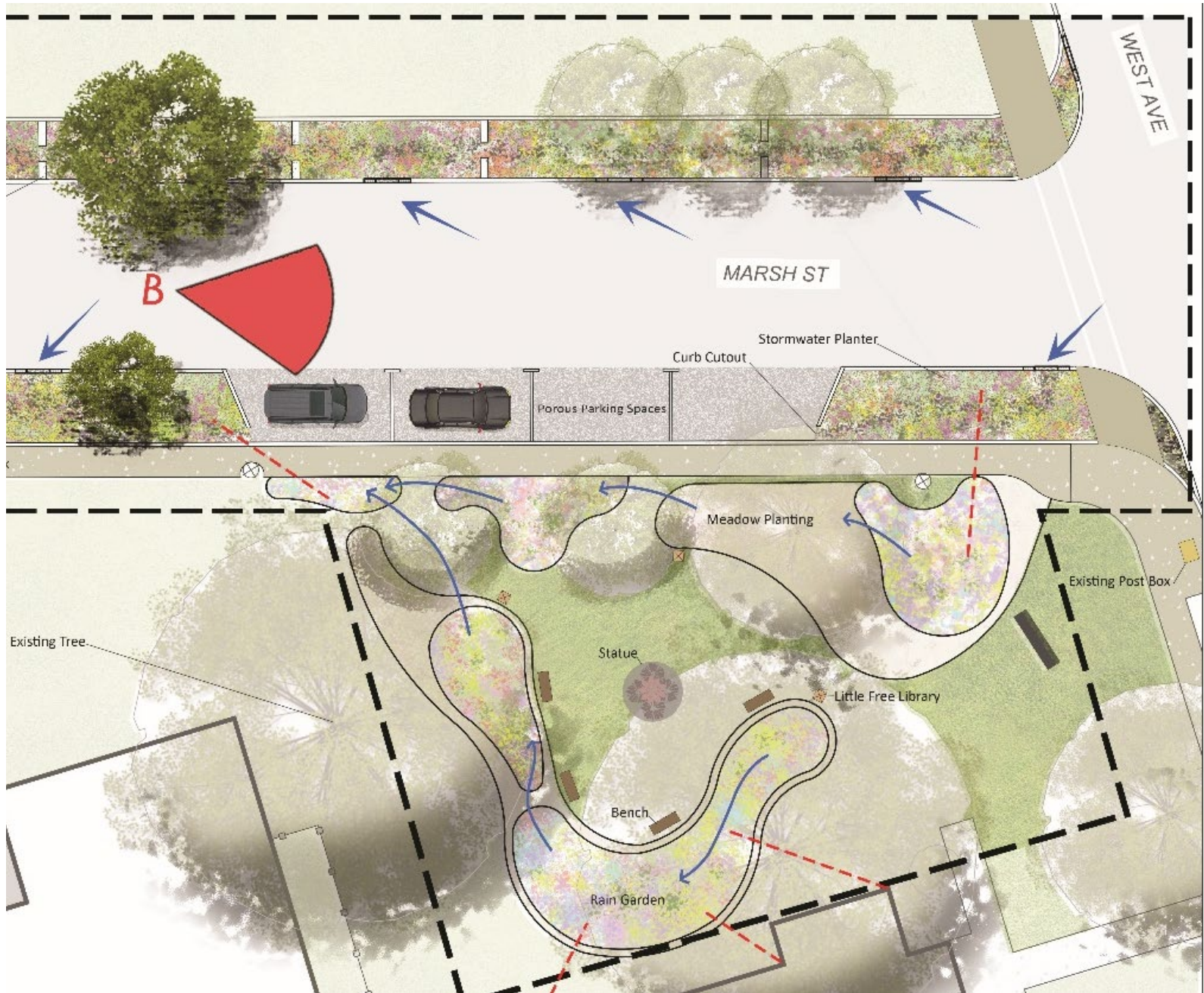
## Marsh Street Drainage Calculations

Drainage Area	Stormwater Planter Total (SF)	Drainage Area Total (SF)	Water Quality Capture Per Storm (gal)	Annual Volume Captured (gal/yr)
Drainage Area 1	1885	10745	5670	186100
Drainage Area 2	2135	8645	6740	213400
Total Area	4000	18890	12610	399500
Library Drainage Area	720	620	480	15300



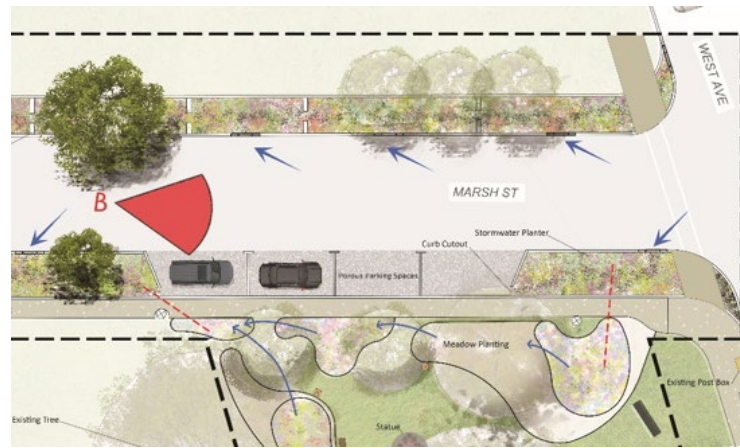


# Conceptual Plan





# Rendering View B





# Final Engineering Plans

## TO BE CONSTRUCTED: STORMWATER PLANTER

PAY ITEM NUMBER	ITEM DESCRIPTION	QUANTITY
1	36" EXCAVATION W/ DRAINING	2,835 SF (310 CY)
3	COMPACTED AGGREGATE BASE (#47 STONE)	25 CY
4	3" CURB WALL W/ FOOTING	693 LF
5	12" BACKFILL LINOCOMPACTED AGGREGATE (#47 STONE)	80 CY
6	12" BACKFILL OF BIORETENTION SOIL	92 CY
7	3" HARDWOOD MULCH	23 CY
8	CONCRETE FLOW PAD	2 LIN
9	LANDSCAPE FABRIC	170 SF
10	3/4" RIVER STONE	4.5 TON
11	PLANTINGS	622 LIN

## TO BE CONSTRUCTED: ROADWORK

PAY ITEM NUMBER	ITEM DESCRIPTION	QUANTITY
1	HMA MILLING, 2"	9,850 SF (1,142 SY)
2	2" HOT MIX ASPHALT 3.5MB4 SURFACE AND LEVELER COURSE	9,850 SF (115 TONS)
3	CONCRETE SIDEWALK, 4" THICK	1,165 SF (129 SY)
4	CONCRETE LANDING PADS	338 SF (37.5 SY)
5	DETECTABLE WALKING SURFACE	92 SF (3.5 SY)
6	9' X 20' CONCRETE VERTICAL CURB	117 LF
7	RECONSTRUCT INLET, TYPE B	2 LIN
8	FERTILIZING	129 SF (14 SY)
9	SODDING	129 SF (14 SY)

## TO BE CONSTRUCTED: RAIN GARDEN

PAY ITEM NUMBER	ITEM DESCRIPTION	QUANTITY
1	21" EXCAVATION	390 SF (10 CY)
2	12" BACKFILL BIORETENTION SOIL	9 CY
3	3" HARDWOOD MULCH	4 CY
4	4" PVC 80#-35 LEADER DRAIN EXTENSION OR RECONSTRUCTION	129 LF
5	LANDSCAPE FABRIC	15 SF
6	3/4" RIVER STONE	0.5 TON
7	RAIN GARDEN PLANTINGS	67 LIN
8	LIBRARY PLANTINGS	452 LIN

## REFER TO DT-1 FOR FULL NOTES THAT SHOULD BE READ PRIOR TO MOBILIZATION

- PLANTING:**
- CONTRACTOR SHALL SCHEDULE MEETINGS WITH ENGINEER AND PROPERTY OWNER PRIOR TO MOBILIZATION AND CONSTRUCTION.
  - CONTRACTOR SHALL VERIFY ALL INFORMATION INCLUDING ELEVATIONS AND UTILITIES PRIOR TO CONSTRUCTION.
  - CONTRACTOR SHALL VERIFY ALL PROPOSED MATERIALS WITH PROPERTY OWNER AND ENGINEER PRIOR TO CONSTRUCTION.
  - CONTRACTOR SHALL STAKE OUT LOCATIONS OF PROPOSED BMPs AND OBTAIN APPROVAL FROM ENGINEER PRIOR TO INSTALLATION.
  - CONTRACTOR SHALL GRADE SITE AS SHOWN ON PLAN. CUT SOIL SHALL BE REUSED ON SITE FOR FILL LOCATIONS.
  - CONTRACTOR SHALL HALL EXCESS SOIL OFF SITE UNLESS OTHERWISE NOTED BY PROPERTY OWNER.
  - ALL FINISHED ELEVATIONS SHALL MATCH ADJACENT PAVEMENT ENSURING SMOOTH TRANSITIONS AND NO TRIPPING HAZARDS.
  - CONTRACTOR SHALL BE RESPONSIBLE FOR RESTORING ALL AREAS DISTURBED DURING CONSTRUCTION TO ORIGINAL CONDITIONS.

**NOTE 1:** STONE SHALL BE COMPOSED OF 3/4" DIAMETER CLEAN, WASHED RIVER STONE. ALL AREAS OF EROSION PROTECTION STONE SHALL BE UNDERLAIN WITH GEOTEXTILE FABRIC (#200X 80# BY PROPEX OR APPROVED EQUIVALENT).

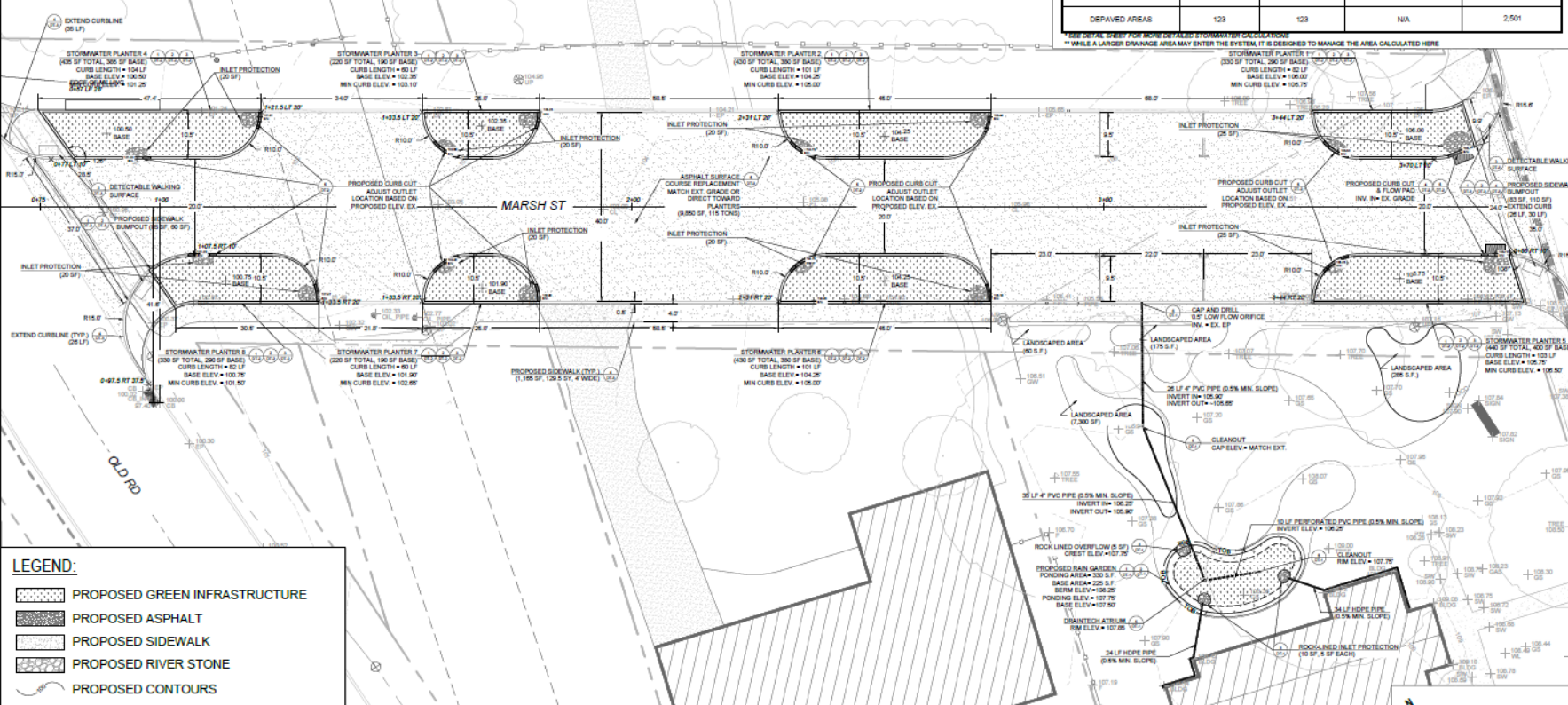
**NOTE 2:** UNDERDRAIN MAY BE OMITTED BY ENGINEER'S DISCRETION IF THE TESTED INFILTRATION RATE EXCEEDS 1 INCH PER HOUR PER BMP MANUFACTURER.

## STORMWATER CALCULATIONS\*

GREEN INFRASTRUCTURE PROJECT	PROJECT SIZE (SF)	TOTAL IMPERVIOUS DRAINAGE AREA (SF)	DRAINAGE AREA MANAGED** (WATER QUALITY STORM) (SF)	ANNUAL RUNOFF VOLUME MANAGED (GAL.)
RAIN GARDEN	330	660	660	10258
STORM WATER PLANTER 1-4	1,145	7,095	7,095	183,096
STORM WATER PLANTER 5-8	1,260	6,955	6,955	159,083
LANDSCAPED AREAS	7,820	N/A	N/A	18,260
DEPAVED AREAS	123	123	N/A	2,501

\*SEE DETAIL SHEET FOR MORE DETAILED STORMWATER CALCULATIONS

\*\*WHILE A LARGER DRAINAGE AREA MAY ENTER THE SYSTEM, IT IS DESIGNED TO MANAGE THE AREA CALCULATED HERE



**LEGEND:**

- PROPOSED GREEN INFRASTRUCTURE
- PROPOSED ASPHALT
- PROPOSED SIDEWALK
- PROPOSED RIVER STONE
- PROPOSED CONTOURS
- PROPOSED SPOT ELEVATIONS

**SPOT ELEVATION CODES:**  
 INV. - BOTTOM OF CURB CUT  
 BASE - FINISHED GRADE OF PLANTER CELL

Navigation and scale controls: 37.7% zoom, pan, and scale bar.

**SITE PLAN**  
 SCALE 1"=10'  
 NORTH ARROW

**PROPOSED SITE PLAN**

**GREEN STREET IMPLEMENTATION PROJECT**  
 WOODBRIDGE TOWNSHIP, MIDDLESEX COUNTY, NJ

**RUTGERS**  
 New Jersey Agricultural Experiment Station

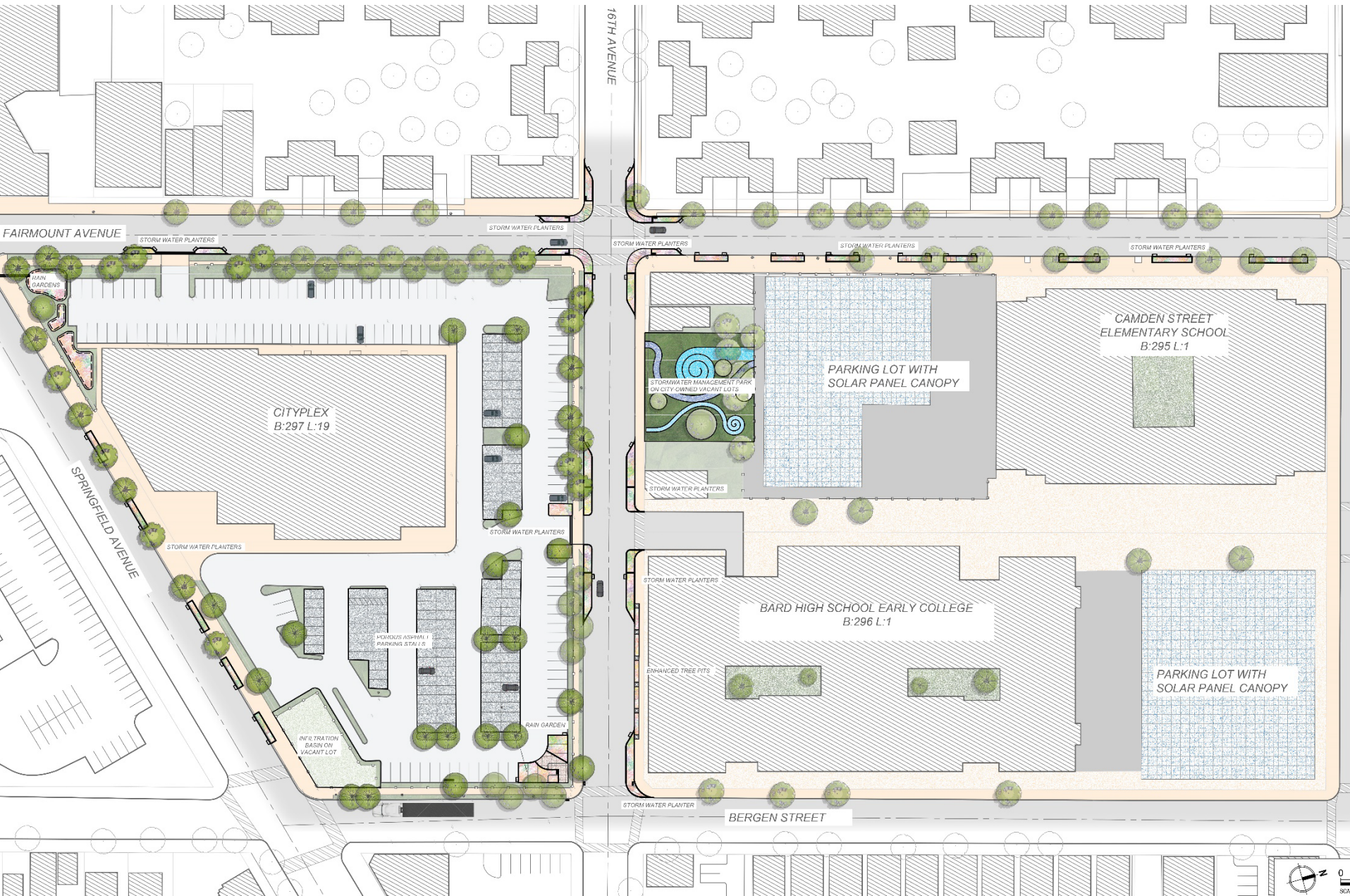
**PROJECT TEAM:**  
 CHRISTOPHER C. ORSHY, P.E., P.C.  
 PROFESSIONAL ENGINEER, LICENSE # 2102

**DATE:** 11/13/2024

**SHEET NAME:** P-2



# Conceptual Plan – Cityplex, Newark







PLANTERS

STORM WATER PLANTERS

POROUS ASPHALT  
PARKING STALLS

INFILTRATION  
BASIN ON  
VACANT LOT

RAIN GARDEN

STORM WATER PLANTERS

BARD

ENHANCED TREE PITS

STORM WATER PLANTER

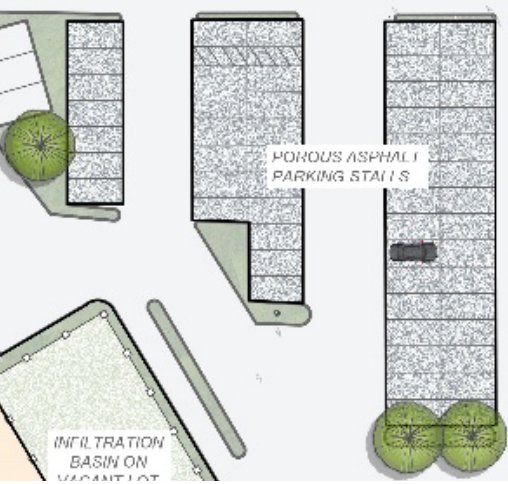
BERGEN ST







CITYPLEX  
B:297 L:19



STORM WATER PLANTERS

RAIN GARDEN

STORMWATER MANAGEMENT PARK  
ON CITY-OWNED VACANT LOTS

STORM WATER PLANTERS

STORM WATER PLANTERS

ENHANCED TREE PITS

PARKING LOT WITH  
SOLAR PANEL CANOPY

BARD HIGH SCHOOL EARLY COLLEGE  
B:296 L:1





Google









- LEGEND:**
- RAIN GARDEN
  - BIOSWALE
  - CISTERN
  - PERMEABLE PAVERS
  - PLANTER BOXES
  - MEADOW AREAS
  - ADA - PARKING
  - APPLE ORCHARD

CHRISTOPHER C. OBROPTA, PH.D., P.E.  
 PROFESSIONAL ENGINEER - LICENSE # 27028

NO.	DESCRIPTION	DATE	BY	DATE	BY
1	ISSUED FOR PERMITS TO MAINTAIN TRAILS				

APPEL FARM ARTS AND MUSIC CENTER  
 GREEN INFRASTRUCTURE IMPLEMENTATION PROJECT  
 457 SHIRLEY ROAD, ELMER  
 SALEM COUNTY, NJ












SHEET NAME  
 P-1



MASTER PLAN



- LEGEND:**
-  RAIN GARDENS
  -  BIOSWALES
  -  CISTERNS
  -  PERMEABLE PAVERS  
Any emergency or maintenance road can be converted to permeable pavers
  -  POROUS PAVEMENT
  -  EXISTING TREES
  -  EXISTING LIGHTPOLES
  -  PROPOSED TREES
  -  PROPOSED PATH



DESCRIPTION		DATE	BY
PHASE 1 - FAS 841		4/20/2021	CS
EDITED TO PHASE 2 AS BUILT		1/10/2021	CS
APPROVED	DATE	BY	DATE

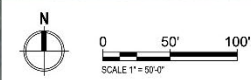
**SALEM HIGH SCHOOL  
RAIN GARDEN IMPLEMENTATION PROJECT**  
219 WALNUT STREET, SALEM  
SALEM COUNTY, NJ



**CHRISTOPHER C. OBROPTA, Ph.D., P.E.**  
PROFESSIONAL ENGINEER - IN LICENSE # 11332

**MASTER PLAN**





**MASTER PLAN**

PLAN REVISIONS		DESCRIPTION
No.	DATE	

**FAIRFIELD MUNICIPAL BUILDING / SENIOR CENTER**  
 [70 FAIRTON GOULD TOWN ROAD, BRIDGETON]  
 CUMBERLAND COUNTY, NJ







- LEGEND:**
- EXISTING TREES
  - EXISTING LIGHTPOLES
  - RAIN GARDENS
  - BIOSWALES
  - CISTERNS
  - TURFSTONE PAVERS
  - POROUS PAVEMENT
  - PLANTER BOX
  - TREE FILTER BOXES
  - PROPOSED TREES
  - PROPOSED PATH



**MEMORIAL PARK BLUE BARN  
PERMEABLE PAVEMENT IMPLEMENTATION PROJECT  
1004 TUCKERTON ROAD, WARLTON  
BURLINGTON COUNTY, NJ**

**MASTER PLAN**

SHEET NUMBER	DATE	DESCRIPTION	DESIGNED	CHECKED	APPROVED	DATE

CHRISTOPHER C. OBROPTA, Ph.D., P.E.  
PROFESSIONAL LANDSCAPE ARCHITECT # 21032

DATE: 02/20/22

SHEET: 01/01

PROJECT: 22001







# MASTER PLAN

PLAN REVISIONS	
No.	DATE

CHRISTIC  
PROFESSION

FAITH BIBLE CHURCH  
3139 E CHESTNUT AVENUE, VINELAND  
CUMBERLAND COUNTY, NJ

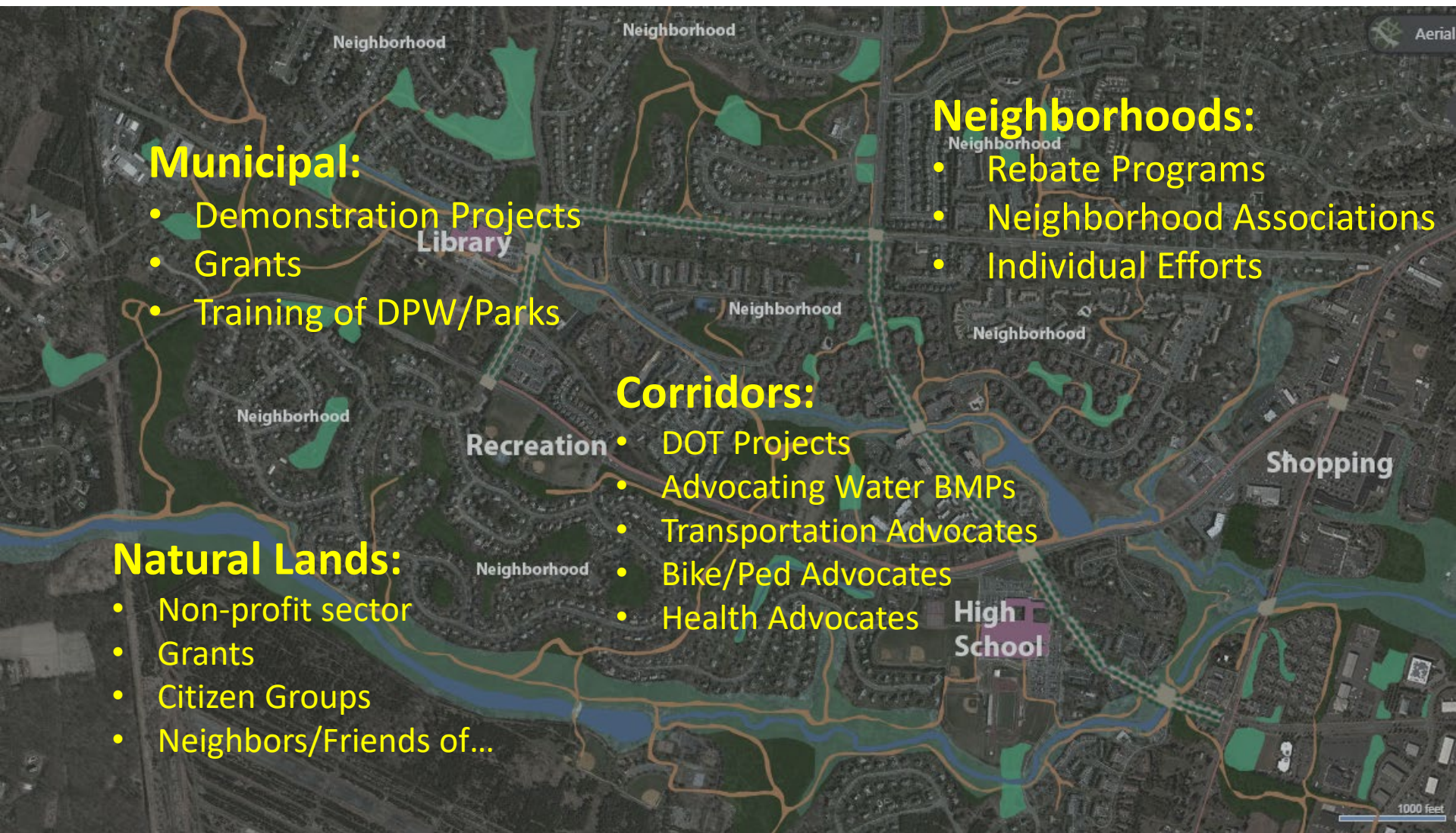
MASTER PLAN

**RUTGERS**  
New Jersey Agricultural  
Experiment Station

SHEET NAME  
P-1



# Steps Towards Achieving this Type of Plan



**Local Champions make it all happen!**



# Steps Towards Achieving this Type of Plan



**Local Champions make it all happen!**





**QUESTIONS?**