




DESIGN CONCEPTS
for
SUSTAINABLE GARDENS
Part II

Sustainable Approaches

- Preservation
- Conservation
- Restoration
- Regeneration
- Design for the Context
- Support for Habitats
- Multi-purpose
- Enjoyment



Vegetation and Soil Protection Zones (VSPZ)

**NEW YORK STATE - DEPARTMENT OF
ENVIRONMENTAL CONSERVATION**

Environmental Resource Mapper

Search

Layers & Legend

Tell Me More...











Need a Permit?

Contacts

Help

Map Layers & Legend


More layers appear as you zoom in.


- ☒  Classified Water Bodies
- ☒  Classified Water Bodies
- ☒  State-Regulated Freshwater Wetlands
- ☒  Wetland Checkzone ?
- ☒  Rare Plants and Rare Animals
- ☒  Significant Natural Communities
- ☒  Natural Communities Vicinity ?
- ☒  Background Map
- ☒  Adirondack Park Boundary
- ☒  Counties

Click "Refresh Layers" to activate and deactivate layers.

Refresh Layers

Locations of old and potential records of rare animals and plants do not display on the map.





Restoration

- Greyfields –
previously developed sites
- Brownfields –
recognized with Phase II ESA





Restoration

Stacy Levy and Julie Bargeman





Regeneration

Living Building Challenge



Omega Center for Sustainable Living, Rhinebeck, NY





©Kevin Burke

William McDonough



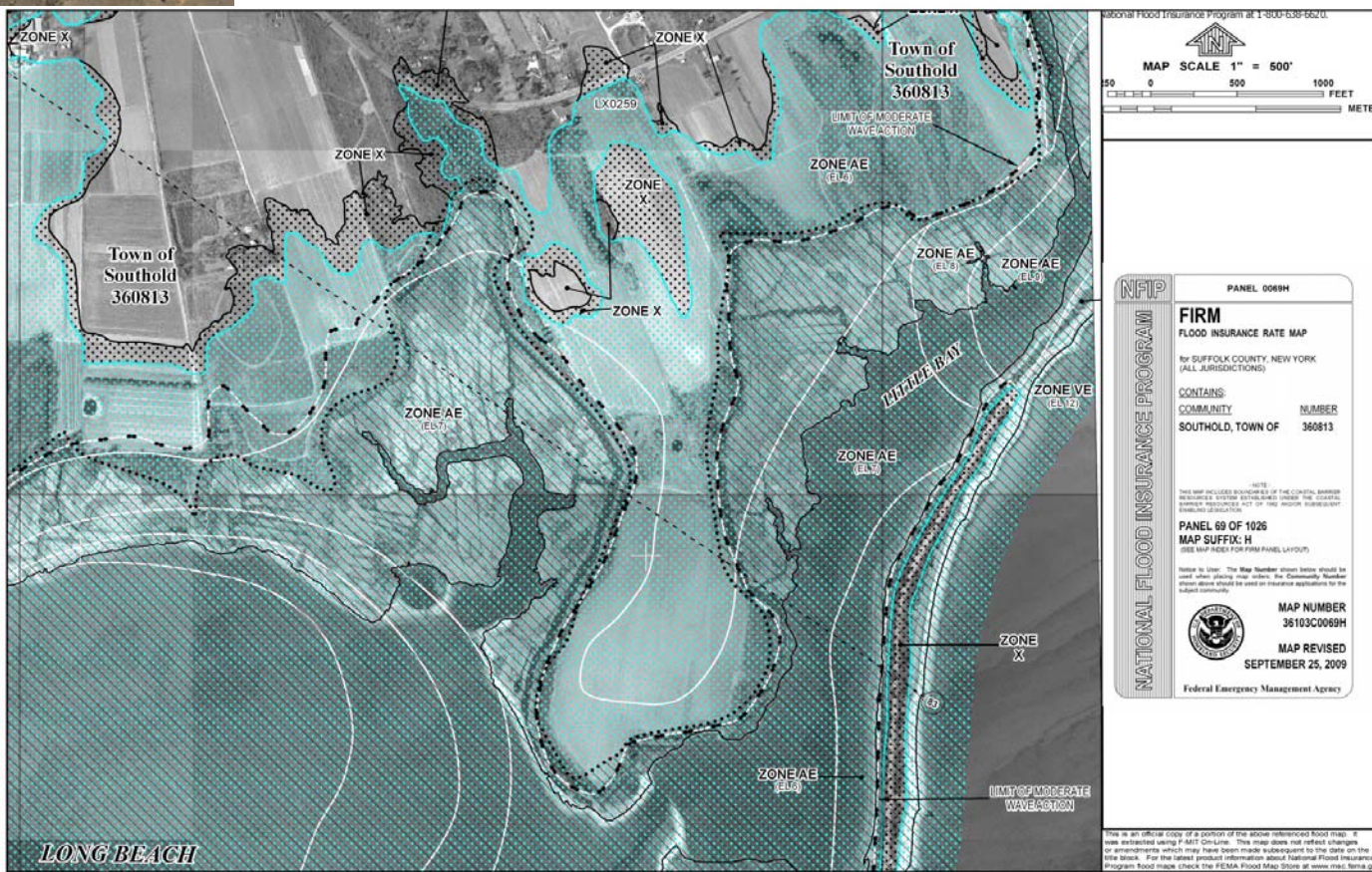
The Sustainable Sites Initiative










- Site Selection
- Site Assessment and Planning
- Design
 - Water
 - Soil and Vegetation
 - Materials Selection
 - Human Health + Well Being
- Construction
- Operations + Maintenance
- Monitoring and Innovation



Flooding FEMA

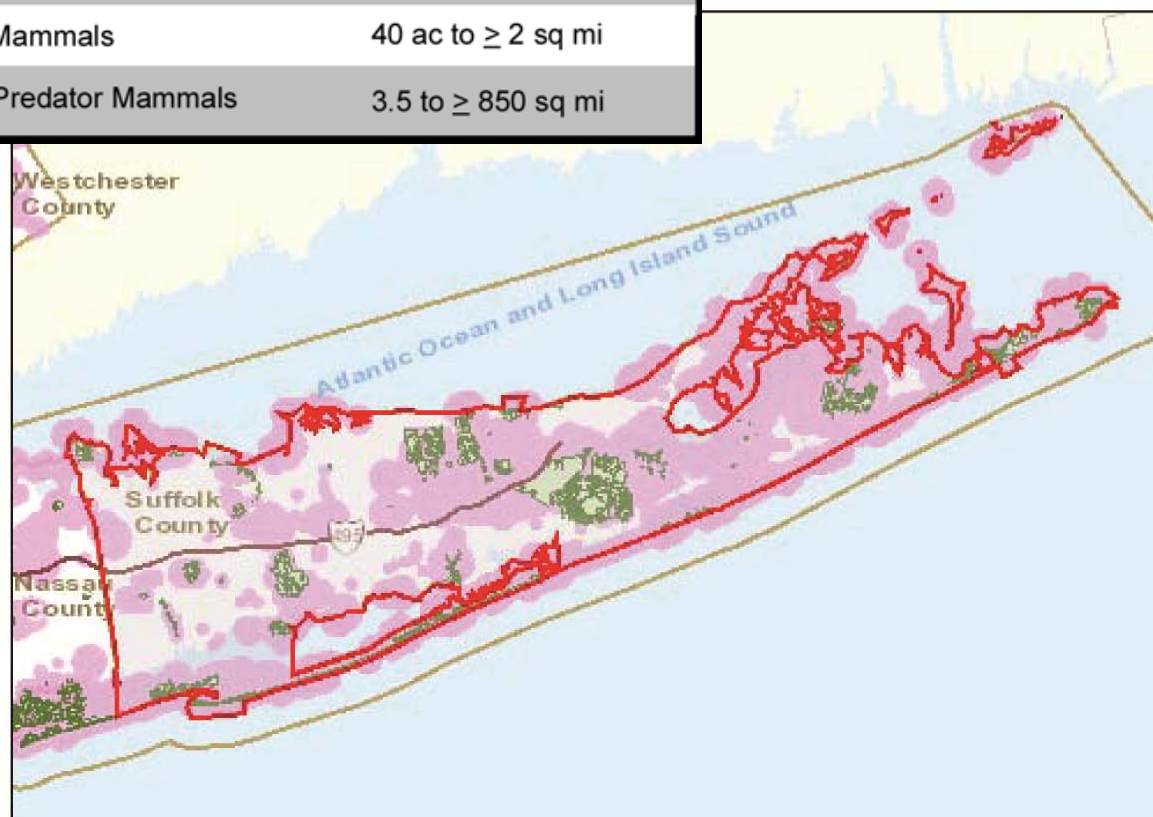
www.fema.gov



Example Ranges of Minimum Patch Area		
Taxa	Patch Area	
 Plants	5 to \geq 250 ac	
 Invertebrates	50 sq ft to \geq 2.5 ac	
 Reptiles and Amphibians	3 to \geq 35 ac	
 Grassland Birds	12 to \geq 135 ac	
 Waterfowl	\geq 12 ac	
 Forest Birds	5 to \geq 95 ac	
 Small Mammals	2.5 to \geq 25 ac	
 Large Mammals	40 ac to \geq 2 sq mi	
 Large Predator Mammals	3.5 to \geq 850 sq mi	

Endangered

<http://www.dec.ny.gov/natureexplorer/app/>



Legend

Major Cities



Interstates



Natural Communities



Rare Plants and Animals (Generalized)



Counties



Major Waterbodies



Surrounding States



Threats to Biodiversity

- habitat destruction, alteration and fragmentation;
- the spread of invasive species;
- pollution;
- illegal collection;
- climate change.



KEEP OUT

THIS AREA HAS BEEN DESIGNATED
AS A RE-NATURAL ENVIRONMENT

MOWING, CHEMICAL SPRAYING
OR OTHER RELATED ACTIVITIES
WILL DISRUPT THE RE-NATURAL
DEVELOPMENT OF PLANTS AND
ANIMALS THAT ARE ESTABLISHING
THEMSELVES AT THIS SITE

 The Society for a Re-Natural Environment
www.srnenvironment.net

Brian D. Collier

Habitat Acquisition Site #0001112906CUIL
Site condition when acquired on 11.29.2006



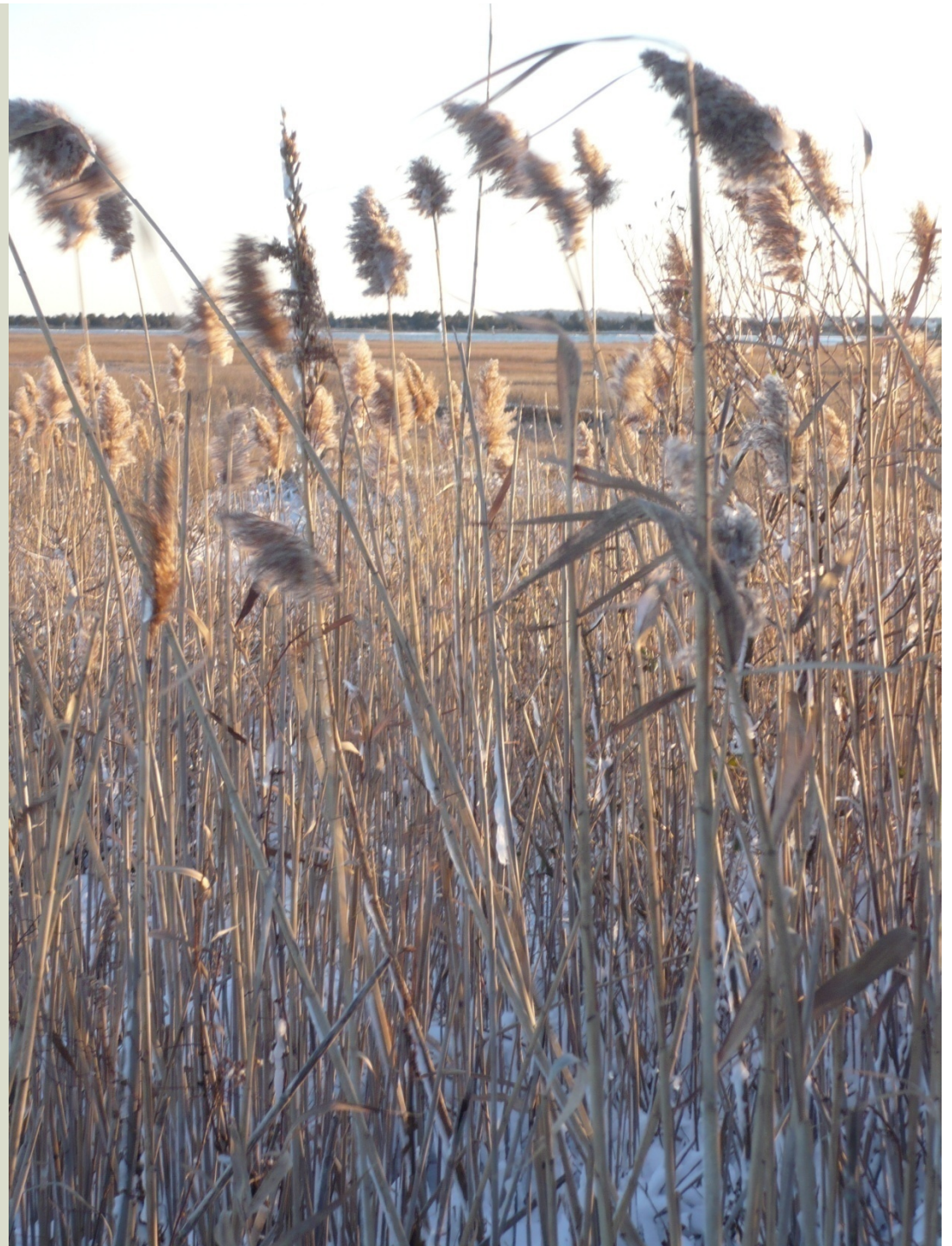
Habitat Acquisition Site #0001112906CUIL
Site development as of 06.21.2007



Habitat Acquisition Site #0001112906CUIL
Site development as of 07.17.2009 (fencing going up around field)



Invasives

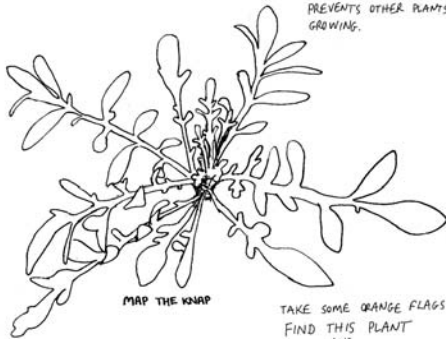


Invasives

Bob Braine + Leslie Reed



SPOTTED KNAPWEED
(*CENTAUREA MACULOSA*)



MAP THE KNAP

A HIGHLY OPPORTUNISTIC PLANT
THAT EXUDES A TOXIC
SUBSTANCE FROM ITS ROOTS THAT
PREVENTS OTHER PLANTS FROM
GROWING.

TAKE SOME ORANGE FLAGS
FIND THIS PLANT
AND
MARK IT.
IN A MONTH ALL OF THE
MARKED PLANTS WILL BE REMOVED.



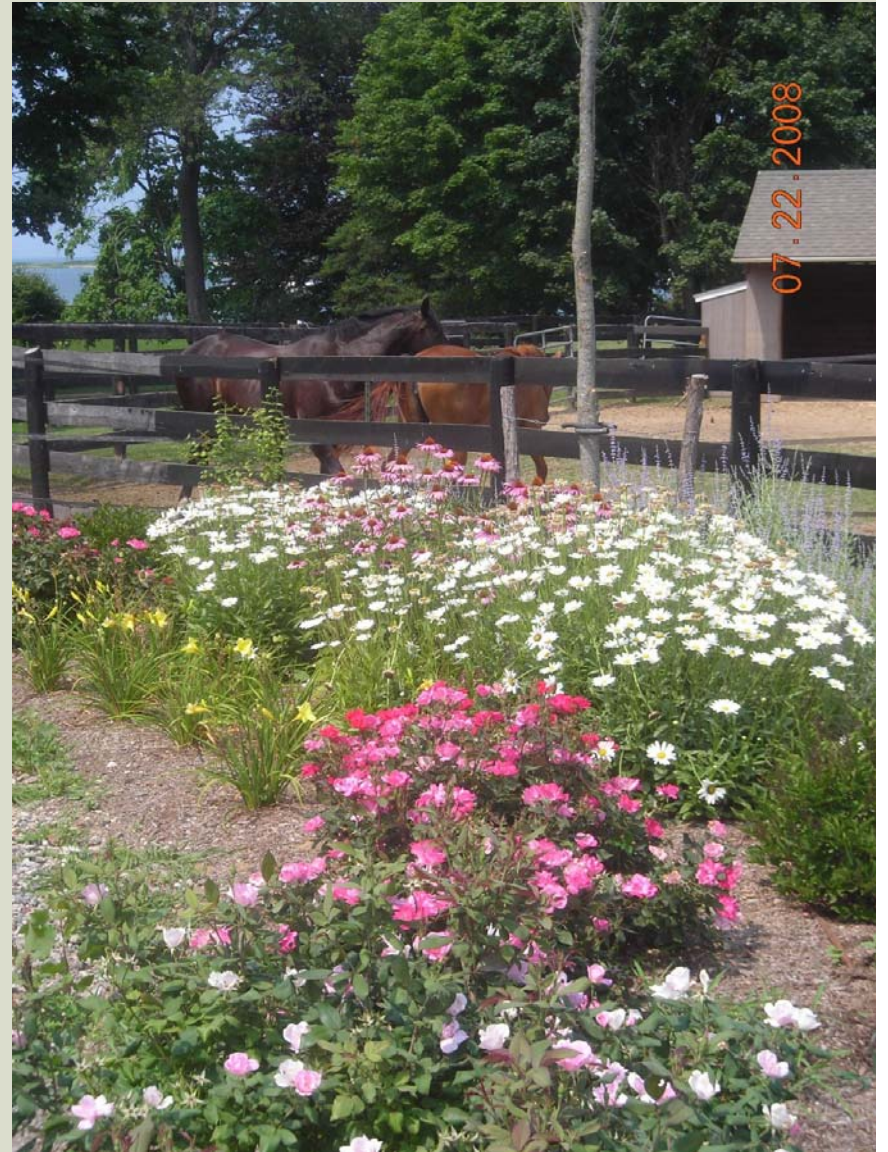
Native Plants





Laura
Schwanof

Laura Schwanof



Appropriate Plants Species

- Cold hardiness
- Heat tolerance
- Salt tolerance
- Soil moisture range
- Plant water use requirements
- Soil volume requirements
- Soil pH requirements
- Sun/Shade requirements
- Pest susceptibility
- Maintenance requirements

Water Use

Table 1. Typical Domestic Daily per Capita Water Use.³

Use	Gallons per Capita	% of Daily Total
Potable indoor uses		
• Showers	11.6	7.0%
• Dishwashers	1.0	0.6%
• Baths	1.2	0.8%
• Faucets	10.9	6.6%
• Other uses, leaks	11.1	6.7%
Subtotal	35.8	21.7%
Non-potable indoor uses		
• Clothes washers	15.0	9.1%
• Toilets	18.5	11.2%
Subtotal	33.5	20.3%
Outdoor uses	95.7	58.0%



Evapotranspiration Rate

www.ccesuffolk.org

Monthly Evapotranspiration Rate (inches) Report - 2010*

March through October

Compiled by Thomas Kowalsick

Cornell Cooperative Extension - Suffolk County

423 Griffing Avenue, Riverhead, NY

In Cooperation with the Northeast Regional Climate Center
at Cornell University ()

<u>Date</u>	<u>EH</u>	<u>FRG</u>	<u>ISP</u>	<u>NYC</u>	<u>JFK</u>	<u>SHR</u>	<u>WHB</u>
Mar-10	1.38	1.33	1.32	1.51	1.35	1.37	1.36
Apr-10	2.77	2.82	2.69	3.17	2.65	2.72	2.67
May-10	4.04	4.12	4.04	4.37	3.99	4.14	4.99
Jun-10	4.13	4.63	4.60	4.97	4.48	4.39	4.15
Jul-10	4.95	4.90	4.70	5.41	4.76	4.92	5.01
Aug-10	4.04	4.25	3.77	4.19	3.78	3.99	4.01
Sep-10	2.83	2.61	2.55	2.92	2.63	2.48	2.63
Oct-10	1.52	1.53	1.37	1.71	1.46	1.43	1.37
Total	25.66	26.19	25.04	28.25	25.10	25.44	26.19

Legend:

*Evapotranspiration Rate determined using the Penman Monteith Method
which is provided by the Northeast Regional Climate Center at Cornell University
<http://www.nrcc.cornell.edu/>

EH = East Hampton (Airport) (Readings taken at 12:00 midnight)

FRG = Farmingdale (Airport) (Readings taken at 12:00 midnight)

ISP = Islip (MacArthur Airport) (Readings taken at 12:00 midnight)

NYC = New York City (Central Park) (Readings taken at 12:00 midnight)

JFK = J.F. Kennedy Airport (Readings taken at 12:00 midnight)

SHR = Shirley (Airport) (Readings taken at 12:00 midnight)

WHB = Westhampton Beach (Gabreski Airport) (Readings taken at 12:00 midnight)

Irrigation Water Reduction

50% minimum for Sustainable Sites

Baseline Landscape Water Requirement

$$BLWR = ET_0 \times A \times C_u$$

Where:

ET_0 = average reference evapotranspiration (ET_0) for the site's peak watering month, provided locally (inches/month).

A = Area of irrigated landscape in square feet (area designed with permanent irrigation systems)

C_u = Conversion factor (0.6233 for results in gallons/month)

Water Reduction Landscape

K_L = Landscape coefficient for plant species

$$K_L = K_D \times K_S \times K_{MC}$$

K_D Density

Low: .5-.9

<70% canopy coverage for trees, and
<90% for shrubs and groundcovers

Average: 1

High: 1.1 – 1.3 Vegetation tiers

$$K_S \times K_{MC}$$

Species Factor - Microclimate

Microclimate Kmc	Low	Average	High
Shading	0.5	0.8	1.0
High Sun exposure	1.0	1.2	1.5
Protection from wind	0.8	0.9	1.0
Windy area	1	1.2	1.5

Irrigation Water Reduction

TABLE 1: PLANT TYPE AND ESTIMATED LANDSCAPE COEFFICIENT (K_L)

Plant Type	K_L		
	Water Requirements		
	Low	Medium	High
Ground Cover	0.2	0.5	0.7
Shrubs	0.2	0.5	0.7
Trees	0.2	0.5	0.7
Turfgrass	0.6	0.7	0.8

Note: The estimated K_L values in Table 1 are taken from the U.S. EPA WaterSense Water Budget Tool (May 2009 revision).

TABLE 2: DISTRIBUTION UNIFORMITY

Irrigation Type	$DU_{(LQ)}$ or EU*
Drip - Standard	70%
Drip - Press Comp	90%
Fixed Spray	65%
Micro Spray	70%
Rotor	70%

Note: The lower quarter distribution uniformity values in Table 2 are taken from the U.S. EPA WaterSense Water Budget Tool (May 2009 rev.). Original source: The Irrigation Association, "Landscape Irrigation Scheduling and Water Management," IA 2005.

*Lower quarter distribution uniformity $DU_{(LQ)}$ applies to sprinkler zones and emission uniformity (EU) applies to drip/micro-irrigation zones.

Soil Biomass Density Index (BDI)

TABLE 4.6-A: CALCULATIONS FOR EXISTING SITE BDI

Land cover/vegetation type zone	Biomass density value* for this zone	Percent of total site area for this zone	Biomass density value x percent of total site area (column B x column C)
A	B	C	D
Trees with understory	6		
Trees without understory (less than 10 percent herbaceous/shrub cover)	4		
Shrubs	3		
Desert plants	1.5		
Annual plantings	1.5		
Grasslands and turfgrass	2		
Wetlands**	6		
Impervious cover or bare ground not shaded by vegetation or vegetated structures	0		
SUBTOTAL (sum of all rows)	n/a	100%	
ADDITIONAL VALUE for other horizontal and vertical surfaces covered with vegetation (e.g., green walls, trellises, pergolas), if applicable: Calculate the total surface area of the vegetated surface, multiply by a biomass density value of 1, and divide by the total site area.			
Existing Site BDI (sum of Subtotal and Additional Value)			

* The biomass density values in column B are based on a literature review of leaf area index for various vegetation types.

** This category includes wetlands with emergent vegetation and does not include open water.

KEY THINGS TO CONTROL

- WATER NEED FOR PLANT SPECIES
- DENSITY OF PLANTING
- MICROCLIMATE
- IF USE IRRIGATION – EFFICIENCY OF SYSTEM
- SOURCE TYPE OF WATER

Thank You

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of

Peconic Green Growth
for Master Gardeners Program

www.peconicgreengrowth.org