



# Landscaping Plan Along Stockton Lake Walking Path at the Sea Girt NGTC



Sea Girt National Guard Training Center  
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## 1.0 Project Overview

The Sea Girt National Guard Training Center (NGTC), purchased by the state of New Jersey in the 1880's, currently serves as a training facility for the National Guard and State Police. This 170-acre campus also provides recreational opportunities for visitors, including soccer fields, camping areas, a beachfront, and a 0.5-mile walking path extending along the southern border of the property and Stockton Lake. Property managers at the (NGTC) would like to increase the aesthetic value of this walking path by planting native shrubs. However, shrubs offer numerous benefits beyond improving aesthetic appearance. They provide habitat and a food source for a variety of birds, insects, and other wildlife, including some rare and threatened species. The implementation of these species in addition to the existing grass between the walking path and Stockton Lake will act as a vegetative filter strip or infiltration buffer where sheet flow is present, preventing sedimentation and total dissolved solids from entering the Manasquan watershed and Stockton Lake. Landscaping and vegetation are an affordable, low-impact, non-structural design that acts as a filter for various properties carried by water runoff and protects and preserves existing natural drainage features like soil and vegetative cover. Plants act as erosion control and reduce nutrient loading by stabilizing the soil physically and chemically. Considering Sea Girt NGTC's immediate proximity to Stockton Lake, the Atlantic Ocean, and therefore the Manasquan watershed, these characteristics are of immense value. The addition of these plants will improve soil and water quality and protect the fragile aquatic ecosystem boarding the NGTC property.

The proposed planting area, as shown in Photos 1-2 of Appendix B, is a narrow (approximately 6-8 feet) strip of maintained grass along a 2,412 foot section of the walking path and Stockton Lake bulkhead, extending from the far west corner of building 60 to the eastern end of the vehicle yard. A map of the proposed project area is included in Appendix A. Landscaping in this area can be challenging due to the close proximity to the Atlantic Ocean and tidally influenced Stockton Lake. Periodic extreme weather events have resulted in flooding in the proposed planting area and extreme gusts of wind. Additionally, soils in the narrow strip of maintained grass along the walking path and bulkhead are likely fill dirt, not native soils. The Environmental Management Bureau (EMB) has tasked the Stockton University Environmental Internship Program (SUEIP) with identifying and proposing suitable candidate species for this project. Suitable species should meet the following criteria:

- Native to NJ
- Low maintenance
- Aesthetically appealing
- Perennial
- Prefer wet to moist soil
- Prefer high saline soil
- Prefer anthropogenic soil
- Full sun
- Tolerant to occasional flooding
- Tolerant to salt spray & coastal breeze
- Hardy & durable
- Minimal risk of disease & pests
- 5 feet maximum height

## 2.0 Project Design, Species Discussion, and Considerations

SUEIP conducted a review of the USDA native species database to compile a list of candidate species that meet these criteria. This database offers a wide variety of criteria that allowed specific searches of various shrub species native to Monmouth County. An initial search of this database generated a list of 10 potentially suitable species that met most of the criteria. After reviewing species-specific profiles, consulting with a Monmouth County Rutgers Master Gardener, and consultation with Rare Find Nursery, SUEIP generated the following list of 9 potentially suitable candidate shrubs:

1. Eastern Baccharis (*Baccharis halimifolia*)
2. Bayberry (*Myrica pensylvanica*)
3. Marsh Elder (*Iva frutescens*)
4. Virginia Rose (*Rosa virginiana*)
5. Beach Plum (*Prunus maritima*)
6. Harlequin Blueflag Iris (*Iris versicolor*)
7. Common Winterberry (*Ilex verticillate*)
8. Common Elderberry (*Sambucus canadensis*)
9. Swamp Rose (*Rose palustris*)

Eastern baccharis is native to the coastal and further inland regions of Texas to Massachusetts. It is highly tolerant of sea salt spray, making it a perfect candidate. In addition to its salt tolerance, eastern baccharis is tolerant of a variety of soils, droughts, and flooding. Eastern baccharis can reach heights of 5 to 12 feet with a 5 to 12-foot spread. This shrub adds aesthetic value, as well as natural resource value to the property, with dense branching, leaves, and white flowers that are a food source and shelter for a variety of butterflies, bees, birds, and other insects. This species is known to attract monarch butterflies, a state species of concern, and according to N.J.S.A. 13:9B-1 ET SEQ. USDA document eastern baccharis may provide suitable habitat for the state endangered black rail, although the surrounding habitat at this site is likely not suitable for this species. The eastern baccharis is a recommended species for man-made wet sites and landscaping in the coastal regions because of its qualities and low maintenance. Eastern baccharis, also known as groundsel tree, was deemed the most suitable of the 9 species for the Sea Girt NGTC property, however it is not appropriate for planting along the southern side of the walking path considering its 5 to 12-foot spread, which could overtake the walking path. It would be perfectly suited in the wider terrain areas on the north side of the walking path.

Other suitable species for this site, but not appropriate for this project are bayberry and marsh elder. This species is native along the mid-Atlantic coastline and highly salt tolerant. The aromatic leaves and berries offer an aesthetically appealing option that attract birds and wildlife. Furthermore, Bayberry shrubs help stabilize and cover back-dunes as well as fix soil nitrogen. They are tolerant of a variety of soil including clay, infertile, and acidic soils once established. It withstands flooding and high coastal winds. Bayberry came at the recommendation of Rare Find Nursery and is a highly suitable option for this site, however like eastern baccharis may take over the walking path with a spread of 5 to 10-feet. The marsh elder meets all of the criteria for this site, but is rather tall for the purpose of this project and is not as aesthetically appealing as the

other species recommended since it lacks flowers and berries. This shrub also offers habitat for various state threatened species like the black crowned night heron and cattle egret.

Suitable species for the purpose of this project include the Virginia rose, beach plum, and harlequin blueflag iris. Virginia rose, beach plum, and harlequin blueflag iris are suitable candidates that offer aesthetic value and will improve soil stabilization along Stockton Lake. The Virginia rose is native to salt marshes, pastures, and roadsides. It offers bright pink, fragrant flowers, however like many roses is prone to many diseases and pests, which can make it labor intensive. Both the Virginia rose, and beach plum can be pruned to prevent overgrowth onto the walking path. While beach plums are highly tolerant of the coastal environment, they prefer less intense sea salt spray in the back-dune regions perfectly suiting them to the project site. Their extensive root system makes them a popular choice for dune restoration, however like Virginia roses, beach plums are susceptible to many diseases and pests. A low maintenance ornamental candidate is the harlequin blueflag iris. This plant is native to wet areas growing along the coast or forested wetlands. It has moderate salt tolerance, which should be adequate for this project considering the planting area is further inland.

Other potential species suitable to the site and project include common winterberry, common elderberry, and swamp rose. The common winterberry is typically native to freshwater wooded wetlands and swamps; however, it is noted to tolerate sea salt breeze. This species is appealing year-round with leaves that shed in the winter, but bright red berries that remain. The berries are a popular food source for many birds and other wildlife species.

Both the common elderberry and swamp rose are the last suggested plants. Sources are not conclusive about these species' sea salt spray tolerance. Both species require intensive management and prefer habitats further inland and along bodies of fresh water. They are intolerant of flooding. While these species are documented tolerating coastal climates, it may compromise their health and appearance.

Beyond the recommended species, 4 other species were investigated, the beach rose, eastern purple coneflower, blue wild indigo, and swamp milkweed, as potential candidates but were later ruled out. While perfectly suited to the coastal climate, the beach rose is not native to America. It is originally from Asia but has recently been used for dune stabilization and aesthetic coastal landscaping purposes in the United States. Some states have declared the species invasive or a nuisance as it can dominant habitats overtaking native species. It is prone to a variety of diseases and pests and offers little benefit to wildlife as the stems are covered with thorns. This is a prohibited species by the NJDEP for planting in dunes, making it unacceptable for this project considering its close proximity to the dunes on site. However, the Virginia rose, and beach plum are recommended as native alternatives to the beach rose. Eastern purple coneflower and blue wild indigo have low salt tolerance, while swamp milkweed has been documented as having demonstrated some degree of salt tolerance. These salt intolerances will make them unsuitable for this project.

### **3.0 Landscaping Design and Cost**

Detailed profiles for all 9 species are included in section 3 below. Pricing comparisons of the species are included in section 5. In order to achieve a natural, aesthetically appealing appearance, SUEIP recommends planting in the following pattern every 20 feet or 121 times on the strip between the walking path and Stockton Lake: one beach plum in a 4 foot section followed by one Virginia rose in a 6 foot section, followed by one harlequin blueflag iris in a 4 foot section, which will be followed by a Virginia rose in a 6 foot section. Furthermore, slight variation in planting distance to the walking path and Stockton lake, with some Virginia roses closer to the water and harlequin blueflag iris closer to the walking path, will improve the appearance by providing depth and variation. SUEIP recommends planting eastern baccharis along the northern side of the walking path in larger open areas or drainage areas to reduce runoff and act as a vegetative filter strip. This particularly pertains to the areas between the campsite walking paths where a storm drain is present, and erosion appears to be a concern. Pricing and quantity of plants for this planting pattern can be found in section 5. To increase efficiency, it is recommended that a gas or electric powered augur be used to dig the holes for planting. The estimated cost to rent a power augur is approximately \$300.

The estimated cost for all plants following this design throughout the entire proposed planting area at the recommended spacing and eastern baccharis on the north side is \$3,749, if medium size plants are purchased through the Pinelands Nursery and Cicconi farms. This brings the total estimated cost to complete this project, including plants and equipment, to \$4,049. Pinelands Nursery is recommended by Rare Find Nursery to purchase native plant species and will be the primary source for this project. If planting at the recommended spacing and pattern is cost prohibitive, SUEIP recommends reducing the proposed planting area and planting in 20-foot increments as financial ability allows. It is estimated to cost \$30 per 20 feet with the recommended pattern and spacing. While larger pots are associated with a higher price, the plant success rate increases as the starting root system increases. Another alternative option to reduce the cost is postponing the addition of eastern baccharis, which would reduce the total project cost to approximately \$3,612. Prior to any large-scale planting efforts SUEIP recommends a soil analysis for pH, grain size, texture and other soil properties in accordance with the Monmouth County Master Gardeners recommendations to ensure appropriate plant selection. The shrubs should be planted in spring after risk of frost has passed. SUEIP recommends initially planting a 200 foot stretch closest to the coast and monitoring the plants health over the course of 1-2 months to ensure its suitability and durability at this site. If the plants remain healthy and tolerate the wet, poorly drained soil and sea salt spray, begin increasing the quantity through the remainder of the summer until the entire proposed planting area is filled or as financial ability allows.

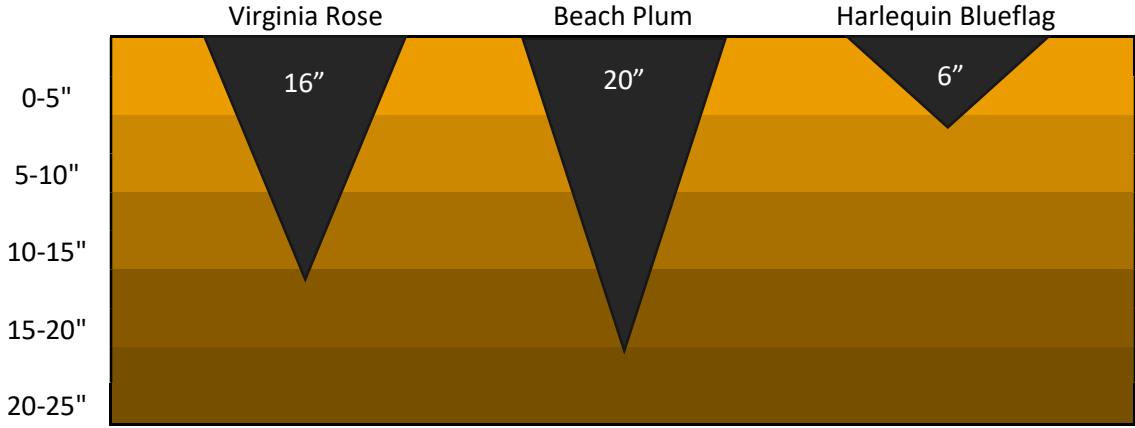
## 4.0 Soil Properties and Considerations

SUEIP recommended a thorough soil analysis including pH, grain size, texture, soil moisture, organic carbon, and organic matter content, however due to time constraints only an analysis of soil pH and moisture content was conducted. The data from this analysis can be found in Appendix D. Below is a figure portraying the results of the soil analysis correlating to the sample depth. A suitable soil moisture content to support plants is between 10 and 45 percent. The soil at the proposed planting location is relatively dry in the upper layers of the soil, however, approaches a more sustainable level to support plants as the depth increases. A pH analysis demonstrated the soil is more acidic with pH values ranging between 4.49 and 6.58. Based on these results the soil characteristics at the associated minimum root depths of the three recommended plants appears suitable. However, the pH levels have the potential to be too acidic for the plants to tolerate as the roots exceed their minimum root depth. See section 4.2 for the minimum root depths of the recommended plants. If the leaves begin to yellow apply wood ash or lime to increase the soils pH. See table SG3 in Appendix D for pricing and application guidelines. At this time SUEIP does not recommend making any amendments to the soil.

### 4.1 Soil Analysis Results Correlating to Sample Depth

SG_L1			SG_L2		
Moisture Content		pH	Moisture Content		pH
0.91%	0"-7.25"	6.58	2.24%	0"-7"	5.84
2.76%	7.25"-14.5"	6.49	1.74%	7"-14"	6.01
4.52%	14.5"-21.75"	6.17	5.31%	14"-21"	5.92
9.77%	21.75"-29"	5.99	8.88%	21"-28"	5.51
			15.70%	28"-35"	5.44
			19.90%	35"-42"	4.49

## 4.2 Minimum Root Depth of Recommended Species





## 5.0 Species Profiles

### 5.1 Eastern Baccharis (*Baccharis halimifolia*)

AKA: Groundsel tree, silverling, sea myrtle, manglier, consumption weed, saltbush



NJ Native?  Salt Spray Tolerant?

#### Pros:

- Food source for butterflies, bees, birds, and other insects including the Monarch butterfly.
- Provides nesting site and cover for birds and wildlife.
- Potential habitat for Black Rail (*Laterallus jamaicensis*) a state endangered species.
- NJDEP approved dune restoration vegetation species.

#### Cons:

- Some sources report this species as a problem weed or invasive presence of rangelands, pastures, parks, recreational area, and floodplains.
- May be toxic to some wildlife or offer no value, desirable food source for white-tailed deer.

Species Details	
<b>Sun</b>	Full to Partial
<b>Soil preference</b>	Dry to Wet; Gravel to fine sands, sandy loam, sandy, acid-based soil
<b>Height</b>	5-12 feet
<b>Spread</b>	5-12 feet
<b>Spacing</b>	At least 3-5 feet between young plants
<b>Sea salt spray tolerance</b>	High sea salt spray tolerance
<b>Other tolerances</b>	Occasional drought, flooding, alkaline clay, clay soil, road salt, anthropogenic/disturbed sites, varying pH, high salt tolerance
<b>Maintenance</b>	Pruned at least once a year to prevent spreading.

**Additional Information:** Native along the shore or further inland from Texas to Massachusetts. Recommended as a garden shrub or hedge in coastal regions because of its hardy nature, freedom of disease, and resistance to salt spray. Used for reclaiming wet sites like retention areas and drainage ponds. This is a deciduous species that requires a male plant nearby to pollinate female plants in order to produce fruit. Recommended as the most suitable for this project by Monmouth Master Gardeners Program.

5.2 Bayberry (*Myrica pensylvanica*)



NJ Native?  Salt Spray Tolerant?

**Pros:**

- Food source and shelter for birds and wildlife.
- Stabilizes and covers back-dune areas.
- Lacks pests and diseases.
- Fixes soil nitrogen.
- Does well in infertile soil once established.

**Cons:**

- Develop Chlorosis (iron anemia) in high pH soils.
- Intolerant of competing vegetation.

Species Details	
<b>Sun</b>	Full to Partial sun/ shade
<b>Soil preference</b>	Prefer light textured soils that are acidic and sandy texture
<b>Height</b>	5-8 feet, grows shorter on sand dunes and poor soil quality areas
<b>Spread</b>	5-10 feet
<b>Spacing</b>	2-4 feet
<b>Sea salt spray tolerance</b>	High sea salt spray tolerance
<b>Other tolerances</b>	Dry sites, wet sites, occasional flooding, clay soil, road salt, infertile soils once established
<b>Maintenance</b>	Requires removal of potential competing vegetation, mulching newly established seedlings helps with moisture retention and weed prevention, allow natural growth with minimal pruning

**Additional Information:** Native along the east coast in bare sandy soil areas, not sod or cultivated sites due to its intolerance of competing vegetation. This species offers stabilization and cover for the back-dune areas along the mid-Atlantic coastline and fixes soil nitrogen. Requires male and female plants in close proximity for berry production. Berries are a popular food source for birds and wildlife, especially migrating sparrows. Bayberry leaves are known for their aromatic qualities and are used for candle making. With a lack of diseases and pests, this species is a suitable candidate for this project.

### 5.3 Marsh Elder (*Iva frutescens*)

AKA: High-tide Bush



NJ Native?  Salt Spray Tolerant?

**Pros:**

- Tolerates brackish water.
- Beneficial for embankment restoration and stabilization.
- Offers habitat and refuge to small mammals and birds.
- Characteristic species of the state threatened Black Crowned Night Heron and Cattle Egret’s habitat.

**Cons:**

- Not as visually appealing as other species.

<b>Species Details</b>	
<b>Sun</b>	Full to Partial
<b>Soil moisture/ preference</b>	Average to wet soil moisture; well drained; high pH soils
<b>Height</b>	3-8 feet tall
<b>Spread</b>	4-6 feet
<b>Spacing</b>	3-5 feet
<b>Sea Salt spray tolerance</b>	Tolerant of sea salt spray and saline soil
<b>Other tolerances</b>	Well-drained soil, extended flooding, slightly alkaline soil, sand, loam, and clay, tolerates some drought
<b>Maintenance</b>	No recommendations.

**Additional Information:** Grows in mid to high salt marsh-estuaries where roots are not subjected to prolonged flooding. It is occasionally found along canals or ditches, the back of dunes or on muddy coastal shores. Appears to be a suitable choice for this project, meeting all criteria. However, lacks visual appeal of other species.



**5.4 Virginia Rose (*Rosa virginiana*)**

AKA: Wild rose



NJ Native?  Salt Spray Tolerant?

**Pros:**

- Aesthetically appealing with fragrant pink flowers.
- Perfect for coastal gardens.
- Attract bees, pollinators, and birds.
- Easy to grow and winters well.

**Cons:**

- Roses are one of the most susceptible shrubs to pests and diseases requiring intensive management.

Species Details	
<b>Sun</b>	Full
<b>Soil preference</b>	Sandy, light textured soils, but will also do well in medium textured soils, acidic, slightly acidic to neutral
<b>Height</b>	4-6 feet
<b>Spread</b>	6-8 feet
<b>Spacing</b>	6-8 feet
<b>Sea salt spray tolerance</b>	High tolerance of sea salt spray
<b>Other tolerances</b>	Cold climate, moist and dry soils, heavy clayey soils, alkaline soils, well-drained areas
<b>Maintenance</b>	Prune to remove dead blooms, diseased areas, and winter injuries. Recommended application of fertilizer and mulch in late winter or early spring for best flowering.

**Additional Information:** This species grows in salt marshes, pastures, and roadsides. It is a native alternative to beach rose recommended by the NJDEP. It is a popular ornamental shrub with its bright pink fragrant flowers and ease to grow. It is considered a perfect addition to flower and coastal gardens. The Virginia rose is cold hardy, tolerating sandy and clay soils. It begins blooming in June. The dark green leaves and flowers fade away to red and orange leaves during the fall, before falling during the winter with only the fruit remaining. While this species characteristics are suitable for this project it poses intense maintenance considering its high risk for disease and pests.

5.5 Beach Plum (*Prunus maritima*)



NJ Native?  Salt Spray Tolerant?

**Pros:**

- Fruit popular food source for wildlife and birds
- Recommended for dune restoration and revegetation

**Cons:**

- Reported preferred host of invasive browntail moth
- Prone to many diseases and pests that may require intense management
- May spread undesirably if not managed properly

Species Details	
<b>Sun</b>	Full
<b>Soil moisture/ preference</b>	Prefers sandy, well-drained soils with pH 6-7
<b>Height</b>	3-8 feet tall
<b>Spread</b>	3-5 feet if pruned, but cluster can reach 20 feet spread
<b>Spacing</b>	3-5 feet
<b>Sea Salt spray tolerance</b>	Tolerant of sea salt spray
<b>Other tolerances</b>	Large amounts of sand dune accumulation
<b>Maintenance</b>	Pruning and training when plant is dormant in late winter or early spring to prevent unwanted spread and keep fruit off the ground. May require treatment for insects and diseases. Inoculation of arbuscular mycorrhizal fungus and phosphate solubilizing fungus at time of planting shown to enhance salt tolerance and improve soil health.

**Additional Information:** Native to the mid-Atlantic coast, and tidewater streams, this species grows with multiple stems, in a low spreading manner. White flowers bloom between April and June prior to the production of cherry shaped, edible fruit that are ripe between August and September. While salt tolerant, they prefer back dunes where they endure less sea salt spray and well-draining soil. The beach plum is endangered in the states of Maine, Maryland, and Pennsylvania. They are prone to a variety of diseases and pests and may spread undesirably if uncontrolled. This species healthy may suffer at the project location if the soil is not sandy or well-drained.

**5.6 Harlequin Blueflag Iris (*Iris versicolor*)**



**NJ Native?**       **Salt Spray Tolerant?**

**Pros:**

- Aesthetically appealing bluish-purple flowers.
- Attracts hummingbirds, other birds, and pollinators.
- Low maintenance.

**Cons:**

- Susceptible to some pests and diseases.
- Muskrats will eat the roots.
- Easily over-topped by aggressive rhizomatous.

<b>Species Details</b>	
<b>Sun</b>	Full
<b>Soil moisture/preference</b>	Unconsolidated soil high in organic content, moist humus soils, prefer loam, clay, medium-drained, wet, acidic or slightly acidic soil
<b>Height</b>	2-5 feet tall
<b>Spread</b>	2-5 feet
<b>Spacing</b>	2-5 feet
<b>Sea Salt spray tolerance</b>	Moderate salt tolerance
<b>Other tolerances</b>	Moderately brackish water, partial shade, permanent flooding up to 6 inches deep
<b>Maintenance</b>	Requires no maintenance, unless impacted by pests and disease.

**Additional Information:** While primarily native to freshwater habitats like marshes, swamps, wet meadows, and forested wetlands, the Harlequin Blueflag Iris also grows along the shoreline and is documented to be moderately salt tolerant. It develops large bluish-purple flowers atop tall green stems and leaves the last from May through July. They typically grow in clusters directly beside or in water up to 2-4 inches deep but can withstand prolonged flooding up to 6 inches deep. They are recommended for mass planting in wet areas such as rain gardens, water gardens, or pond borders. The Blueflag Iris attracts hummingbirds along with a variety of other bird species and pollinators. While this is a suitable option for this project, it may not be salt tolerant enough to endure the project site.

5.7 Common Winterberry (*Ilex verticillata*)



NJ Native?  Salt Spray Tolerant?

**Pros:**

- Food source and shelter for mammals and over 48 species of birds.
- Aesthetically appealing year-round with bright red berries remaining on the plant through the winter months.
- Growth and form best in open conditions.

**Cons:**

- Requires male and female plants in close proximity for fruit production, but gender of plant unknown until three years after planting and begin flowering.

Species Details	
<b>Sun</b>	Full
<b>Soil preference</b>	Well-drained, wet, or moist acidic soil, organic loams; adaptable to light and heavy soils
<b>Height</b>	5-15 feet, typically between 6-10
<b>Spread</b>	6-10 feet
<b>Spacing</b>	6-8 feet
<b>Sea salt spray tolerance</b>	Sea salt spray tolerant
<b>Other tolerances</b>	Wet sites, occasional and extended flooding, Alkaline soil, Road salt
<b>Maintenance</b>	None listed

**Additional Information:** Although native to freshwater swamps and forested wetlands, the Common Winterberry is a salt tolerant species. It is highly tolerant of occasional and extended flooding. The bright red berries are a popular food source among birds and mammals throughout the year. During the fall, the leaves turn yellow and fall by mid-October, however, the berries remain maintaining its aesthetic appearance. This species grows best in open conditions. Based on these characteristics Winterberry is a suitable option for this project.



**5.8 Common Elderberry (*Sambucus Canadensis*)**

AKA: American elder, sweet elder, wild elder, flor sauco, tree of music, velvet-leaf elder



NJ Native?  Salt Spray Tolerant?

**Pros:**

- Berries provide a food source for birds and other species.
- Attracts butterflies and other insects.
- Demonstrated some resistance to deer.

**Cons:**

- Intolerant of poor draining wet soils, like the property of this project.
- Susceptible to various moth species, fly larvae, and fungus that can compromise the health of the plant or its fruit.

<b>Species Details</b>	
<b>Sun</b>	Full to Partial
<b>Soil moisture/ preference</b>	Average to Wet
<b>Height</b>	5-12 feet
<b>Spread</b>	5-12 feet
<b>Spacing</b>	6-10 feet
<b>Sea Salt spray tolerance</b>	Tolerant of salt spray and saline soil
<b>Other tolerances</b>	Variety of soil, clay soil if well drained, occasional drought or flooding, and road salt
<b>Maintenance</b>	Application of hay, straw or bark chips will help protect the roots, but not required. Pruning can help control spreading and Cane Borers.

**Additional Information:** Occurs along bodies of water such as stream banks, riverbanks, and open places in riparian areas. There are contradicting opinions on its tolerance of high soil moisture. Some say it prefers well drained sunny sites or openings of moist forests and is intolerant of poor-draining wet soils, others declare it a native species of upland or salt panne habitat. This species may or may not be intolerant of the Sea Girt site habitat. If this species is selected for this project, beginning with a few of the species to ensure its suitability and health at this site is recommended. If it remains healthy and tolerates the wet, poorly drained soil, begin increasing the quantity until the desired amount is reached.



5.9 Swamp Rose (*Rose Palustris*)



NJ Native?  Salt Spray Tolerant?

**Pros:**

- Produce fruit that is a food source for birds and other wildlife.
- Attracts butterflies and other insects.
- Decorative year-round.

**Cons:**

- Highly susceptible to pests and disease.
- Medium maintenance.

Species Details	
<b>Sun</b>	Full to Partial
<b>Soil moisture/ preference</b>	Wet to moist soil moisture; Prefers slightly acidic, rich, loamy soil
<b>Height</b>	4-6 feet, up to 7 feet tall
<b>Spread</b>	3-6 feet
<b>Spacing</b>	2-4 feet
<b>Sea Salt spray tolerance</b>	Tolerant of salt spray and saline soil
<b>Other tolerances</b>	Some seasonal flooding
<b>Maintenance</b>	Pruning once a year to shape plant and remove dead or diseased areas. Monitoring and treatment for pests and diseases.

**Additional Information:** Native to woodlands and wetlands this species typically occurs along stream banks, swamps, and marshes. While it appears to be more of a freshwater species, some sites indicate it is salt tolerant. Swamp Rose would require more maintenance than the other species suggested due to its probability of suffering from pests or diseases.

## 6.0 Pricing

Table 1: Price by nursery

	<b>Long Island Native (Unknown Size)</b>	<b>Pinelands Nursery #1 Pots (7" deep x 6" diameter)</b>	<b>Pinelands Nursery Tubelings (4" deep x 2.25" diameter)</b>	<b>Bay Gardens (Unknown Size)</b>	<b>Summersweet Native Plants</b>	<b>Cicconi Farms</b>
<b>Groundsel Tree (Baccharis halimifolia)</b>	\$24.99	\$6.00	\$2.50	\$29.99	Not Available	Not Available
<b>Bayberry (Myrica or Morella pensyanica)</b>	\$9.99 for 1 gallon	\$6.00	\$2.50	\$29.99 for 3 gallon	\$30.00 for 2 gallon	\$17.95 for 3 gallon
<b>Marsh Elder (Iva Frutescens)</b>	\$24.99	\$6.00	\$2.50	Not Available	Not Available	Not Available
<b>Virginia Rose (Rosa virginiana)</b>	\$19.99	\$6.00	\$2.50	Not Available	\$30.00 for 2 gallon	\$9.95 for 2 gallon
<b>Beach Plum (Prunus maritima)</b>	\$24.99	\$9.50 (9" deep x 11" diameter)	\$2.50	Not Available	Sold Out	\$17.80 for 3 gallon
<b>Harlequin Blueflag Iris (Iris versicolor)</b>	\$9.99	Not Available	Not Available	Not Available	\$7.50 for quart	\$8.35 for 2 gallon
<b>Common Winterberry (Ilex verticillata)</b>	\$24.99	\$6.00	\$2.50	\$29.99	\$30.00 for 2 gallon	\$17.95 for 3 gallon
<b>Common Elderberry (Sambucus Canadensis)</b>	\$24.99	\$6.00	\$2.50	Not Available	\$20.00 for 1 gallon	\$17.95 for 3 gallon
<b>Swamp Rose (Rose Palustris)</b>	\$19.99	\$6.00	\$2.50	Not Available	Not Available	Not Available

Table 2: Project spacing, quantity, and price of selected species based on recommended planting pattern, and total expected cost.

	Spacing	Quantity	Nursery	Price	Size	Total Cost Per Species	
<b>Virginia Rose (Rosa virginiana)</b>	6 feet	242	Pinelands Nursery	\$6.00	7" deep x 6" diameter	\$1,452.00	
<b>Beach Plum (Prunus maritima)</b>	4 feet	121	Pinelands Nursery	\$9.50	9" deep x 11" diameter	\$1,149.50	
<b>Harlequin Blueflag Iris (Iris versicolor)</b>	4 feet	121	Cicconi Farms	\$8.35	2 gallon	\$1,010.35	
<b>Groundsel Tree (Baccharis halimifolia)</b>	4 feet	23	Pinelands Nursery	\$6.00	7" deep x 6" diameter	\$138.00	
						<b>Total Estimated Plant Cost</b>	<b>\$3,749.85</b>
						<b>Estimated Cost w/o Groundsel Tree</b>	<b>\$3,611.85</b>
						<b>Estimated Cost per 20 feet South side</b>	<b>\$29.85</b>

Total estimated cost, including plants and augur rental: \$4,049.85

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<http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=281141>

### **Blue Wild Indigo**

<https://plants.ces.ncsu.edu/plants/baptisia-australis/>

<https://plants.usda.gov/core/profile?symbol=BAAU>

### **Swamp Milkweed**

[https://plants.usda.gov/factsheet/pdf/fs\\_asin.pdf](https://plants.usda.gov/factsheet/pdf/fs_asin.pdf)

### **General**

[https://www.npsnj.org/pages/nativeplants\\_Plant\\_Lists.html](https://www.npsnj.org/pages/nativeplants_Plant_Lists.html)

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### **Soil Analysis**

<https://lter.kbs.msu.edu/protocols/39>

<https://stockton0->

[my.sharepoint.com/:w:/r/personal/john\\_hallagan\\_stockton\\_edu/\\_layouts/15/doc2.aspx?sourcedoc=%7BF7A642AF-8BC4-4ED0-9AC2-](my.sharepoint.com/:w:/r/personal/john_hallagan_stockton_edu/_layouts/15/doc2.aspx?sourcedoc=%7BF7A642AF-8BC4-4ED0-9AC2-)

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<https://stockton0->

[my.sharepoint.com/:x:/r/personal/john\\_hallagan\\_stockton\\_edu/\\_layouts/15/Doc.aspx?sourcedoc=%7BD4E1AB09-3832-4EC7-A334-2D62CB99EF71%7D&file=E%20-](my.sharepoint.com/:x:/r/personal/john_hallagan_stockton_edu/_layouts/15/Doc.aspx?sourcedoc=%7BD4E1AB09-3832-4EC7-A334-2D62CB99EF71%7D&file=E%20-)

%20Seabeach%20Amaranth%20Sand%20Grain%20Size%20Analysis%20Data.xlsx&action=default&mobileredirect=true">%20Seabeach%20Amaranth%20Sand%20Grain%20Size%20Analysis%20Data.xlsx&action=default&mobileredirect=true

## **Appendix A: Maps**



Figure SG1

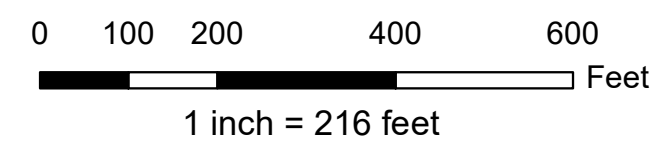
Sea Girt National Guard Training Center

Proposed Landscaping Project Area Along Stockton Lake with Proposed Planting Pattern

2020



- Walking Path
- Proposed Planting Area (Approximately 230m)
- Eastern Baccharis
- Virginia Rose
- Harlequin Blue Flag Iris
- Beach Plum



Stockton Lake

Scale: 1 inch = 216 feet

Date: 5/1/2020

Created by: John Hallagan & Tori Robbins

Stockton University Environmental Internship Program





Figure SG2

Sea Girt National Guard Training Center

Proposed Landscaping Area Planting Pattern Along Stockton Lake

2020



- Walking Path
- Proposed Planting Area (Approximately 230m)
- Eastern Baccharis
- Virginia Rose
- Harlequin Blue Flag Iris
- Beach Plum

0 5 10 20 30 40 50 Feet

1 inch = 18 feet



Scale: 1 inch = 18 feet

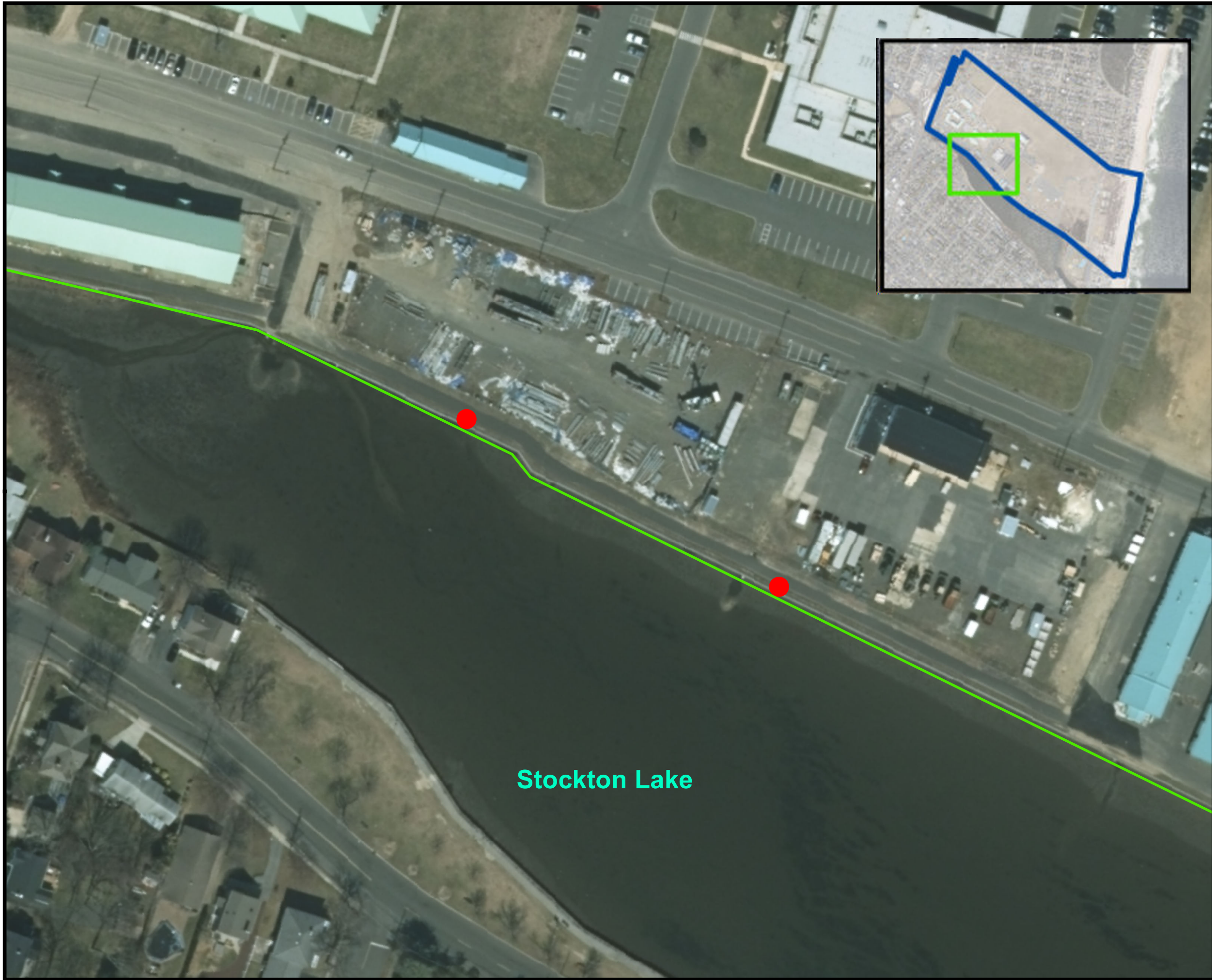
Date: 5/1/2020

Created by: John Hallagan & Tori Robbins

Stockton University Environmental Internship Program






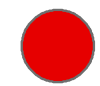


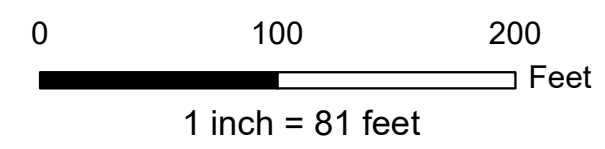
**Figure SG3**

**Sea Girt National Guard  
Training Center**

**Soil Sample Locations  
in Proposed Planting Area**

**2020**

-  Property Line
-  Soil Sample Locations



Scale: 1 inch = 81 feet  
 Date: 6/10/2020  
 Created by: John Hallagan  
 & Tori Robbins  
 Stockton University  
 Environmental  
 Internship Program



## **Appendix B: Project Location Photographs**





Photo 1: East facing view of the walking path, narrow maintained grass area where the shrubs will be planted, and Stockton Lake.



Photo 2: West facing view of the walking path, narrow maintained grass area where the shrubs will be planted, and Stockton Lake.

## **Appendix C: Soil Analysis Methods**

### Soil Moisture Content Analysis Protocol

1. Record the sample ID and collection date on "Datasheet A: Moisture Content Data Sheet".
2. Using a permanent marker, label a drying oven tin with the Sample ID.
3. Weigh the tin, and record the tin mass on Datasheet A.
4. Empty the contents of the sample bag into a plastic bin.
5. Using a plastic spatula, mix the sand thoroughly.
6. Tare the drying tin.
7. Add 160-200g of sand to the tin and weigh immediately. Record the mass on Datasheet A.
8. Place the tin in the drying oven. Repeat steps 1-7 for each sample.
9. Record the Drying Date 1 and Drying Time 1 on Datasheet A.
10. Dry the samples at 105°C, periodically checking to make sure the temperature is still 105°C.
11. After a minimum of 24 hrs, re-weigh each sample, recording the weight on Datasheet A (Drying Weight 2), and place the sample back in the drying oven.
12. After another 5 hrs in the oven, re-weigh each sample, recording the weight on Datasheet A (Drying Weight 3). If Drying Weight 3 is the same as Drying Weight 2, the sample is dry. If Drying Weight 3 is less than Drying Weight 2, continue to dry the sample until there is no change in mass.
13. Calculate Moisture Content:

$$(\text{Wet Mass} - \text{Dry Mass} / \text{Dry Mass}) * 100 = \% \text{ Moisture}$$

## Soil pH Analysis Protocol and Calibration

### 1. Calibrate meter.

- a. Put pH buffer solutions in 50 mL beakers. Have four 100 ml beakers on hand for rinsing the electrode and a squirt bottle filled with nanopure water.
- b. Remove the electrode from the storage buffer and remove the small cap from the fill hole (on the side of the electrode near the top). Rinse the tip of the electrode liberally with distilled water and each time it is removed from a solution.
- c. Press "MODE" to select pH and press "CAL" to start the calibration sequence. The prompt display will alternate between "< 1PT CAL" and "2PT CAL >".
- d. Press the black button to the right of the display for 2-point calibration.
- e. The prompt will read "CAL 1 >". If the displayed buffer value reads "7.00", press the right button indicated by the flashing ">". If not, enter "7.00" on the keypad, then press the indicated button. The readout will show the value of the first buffer and the prompt will read "CAL 1 = "
- f. The prompt display will then read "CAL 2 >". Proceed as above (Step d), entering "4.00". The readout will show the value of the second buffer and the prompt will read "CAL 2 =".
- g. The prompt will then flash between "MEASURE" and "CAL 1". Rinse the electrode and place the electrode in the pH 7 buffer, and press the orange "=" button to start the measurement. Do not place electrode against the bottom of the cup; this will affect the reading.
- h. The prompt will read "CAL 1". When the reading stabilizes, again press "=".

### 2. Measuring sample pH using pH Testr 20 Meter.

- a. In a container combine a 1:1 ratio of distilled water (10 milliliters) and the soil sample (10 grams) by stirring them together.
- b. Allow the solution to sit 15 to 20 minutes.
- c. Gently swirl the solution using the pH meter. Be sure the electrodes do not touch the bottom of the cup as this will impact the reading. Note the pH reading displayed on the meter rounding to the nearest 0.01.
- d. Between samples, rinse the electrode with distilled water (deionized water)



**Appendix D: Soil Analysis and Amendment Tables**

**Table SG1: Soil Moisture Content Analysis**

**Site: Sea Girt**

Dry at 105 degrees Celsius (221 degrees Fahrenheit)

Do not add "Wet" samples to oven while other samples are drying. Drying samples will absorb moisture from the "Wet" samples are "Dry" when the weight is constant for two consecutive readings.

Sample ID	Collection Date	Drying Tin Mass (g)	Drying Date 1	Drying Time 1 (24 hr clock)	Initial/Wet Mass (Mass 1)(Not including Tin weight)(g)	Initial/Wet Mass (Mass 1)(Including tin weight)(g)	Initials	Drying Date 2	Drying Time 2	Drying Mass (Mass 2)(Including Tin)(g)	Drying Mass (Mass 2)(Without Tin Weight)(g)	Initials	Drying Date 3	Drying Time 3	Drying Mass (Mass 3)(Including Tin)(g)	Drying Mass (Mass 3)(Without Tin Weight)(g)	Initials	Wet Mass - Dry Mass (g)	Moisture Content	
SG_L1_S1	6/2/2020	2.830	6/29/2020	14:20	201.596	204.426	JJH	6/30/2020	12:00	202.659	199.829	JJH	7/2/2020	11:20	202.611	199.781	JJH	1.815	0.91%	SG_L1_S1
SG_L1_S2	6/2/2020	2.823	6/29/2020	14:20	202.599	205.422	JJH	6/30/2020	12:00	199.973	197.15	JJH	7/2/2020	11:20	199.982	197.159	JJH	5.44	2.76%	SG_L1_S2
SG_L1_S3	6/2/2020	2.856	6/29/2020	14:20	203.471	206.327	JJH	6/30/2020	12:00	197.529	194.673	JJH	7/2/2020	11:20	197.528	194.672	JJH	8.799	4.52%	SG_L1_S3
SG_L1_S4	6/2/2020	2.841	6/29/2020	14:20	202.349	205.19	JJH	6/30/2020	12:00	187.214	184.373	JJH	7/2/2020	11:20	187.175	184.334	JJH	18.015	9.77%	SG_L1_S4
SG_L2_S1	6/2/2020	2.865	6/29/2020	14:20	200.429	203.294	JJH	6/30/2020	12:00	198.942	196.077	JJH	7/2/2020	11:20	198.912	196.047	JJH	4.382	2.24%	SG_L2_S1
SG_L2_S2	6/2/2020	2.844	6/29/2020	14:20	202.927	205.771	JJH	6/30/2020	12:00	202.298	199.454	JJH	7/2/2020	11:20	202.291	199.447	JJH	3.48	1.74%	SG_L2_S2
SG_L2_S3	6/2/2020	2.837	6/29/2020	14:20	203.251	206.088	JJH	6/30/2020	12:00	195.844	193.007	JJH	7/2/2020	11:20	195.847	193.010	JJH	10.241	5.31%	SG_L2_S3
SG_L2_S4	6/2/2020	2.882	6/29/2020	14:20	200.013	202.895	JJH	6/30/2020	12:00	186.569	183.687	JJH	7/2/2020	11:20	186.575	183.693	JJH	16.32	8.88%	SG_L2_S4
SG_L2_S5	6/2/2020	2.840	6/29/2020	14:20	206.714	209.554	JJH	6/30/2020	12:00	181.517	178.677	JJH	7/2/2020	11:20	181.511	178.671	JJH	28.043	15.70%	SG_L2_S5
SG_L2_S6	6/2/2020	2.796	6/29/2020	14:20	199.921	202.717	JJH	6/30/2020	12:00	169.537	166.741	JJH	7/2/2020	11:20	169.535	166.739	JJH	33.182	19.90%	SG_L2_S6

Average

7.17%

## Table SG2: pH Analysis

Site: Sea Girt

Sample ID	Collection Date	Initials	Analysis Date	pH Value (Scale 0-14)
SG_L1_S1	6/2/2020	JJH	7/2/2020	6.58
SG_L1_S2	6/2/2020	JJH	7/2/2020	6.49
SG_L1_S3	6/2/2020	JJH	7/2/2020	6.17
SG_L1_S4	6/2/2020	JJH	7/2/2020	5.99
SG_L2_S1	6/2/2020	JJH	7/2/2020	5.84
SG_L2_S2	6/2/2020	JJH	7/2/2020	6.01
SG_L2_S3	6/2/2020	JJH	7/2/2020	5.92
SG_L2_S4	6/2/2020	JJH	7/2/2020	5.5.1
SG_L2_S5	6/2/2020	JJH	7/2/2020	5.44
SG_L2_S6	6/2/2020	JJH	7/2/2020	4.49

### Datasheet SG3: Soil Amendement Protocol and Pricing

Approximately 7,236 square foot area

	Quantity	Application Instructions and Notes	Supply Source	Item	Total Price
<b>Wood Ash</b>	140 lbs or 7x 5 gallon buckets (20 lbs per 1,000 sq. ft.)	Apply wood ash over soil, then mix material into the top 2-4 inches. Apply once a year. Best for sandy soils.	NA	NA	NA
<b>Lime</b>	175 lbs (25 lbs per 1,000 sq. ft.)	Apply pelletized limer over the soil, a fertilizer spreader can be used. Mix material into the upper layers of soil add water. Water regularly in order to activate the pellets.	Home Depot	5 bags of Pavestone 40 lbs Pelletized Limestone	\$24.45

\*To prevent over application and high alkalinity, re-test pH annually and after applications.