Hammocks Beach Shoreline Stabilization and Wetland Restoration Project
Hammocks Beach State Park
Swansboro, Onslow County, North Carolina

2004 Annual Monitoring Report

Prepared for: NCDEHNR/Ecosystem Enhancement Program
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Ecosystem Enhancement PROGRAM

NCDENR

NC STATE UNIVERSITY

Hammocks Beach Shoreline Stabilization and Wetland Restoration Site
Fall 2004 Monitoring Summary

A wetland restoration project was funded through the North Carolina Wetlands Restoration Program (NCWRP). The goals of the project are to:

1) Restore spawning habitat for estuarine fish species.
2) Increase delivery of detritus to estuarine food web.
3) Provide buffer between developed areas of park and estuarine waters.
4) Provide demonstration of alternative to bulkhead construction for shoreline stabilization.

This is the 3rd year of the 5-year monitoring plan for the completed Hammocks Beach Site.

Table 1. Background Information

Project Name	**Hammocks Beach Shoreline Stabilization and Wetland Restoration**
Designer's Name	BLUE: Land, Water, Infrastructure, PA 1271 Old Highway #1 South Southern Pines, NC
Contractor's Name	Chadwick Construction Onslow County, NC
Directions to Project Site	The site is located at Hammocks Beach State Park. Turn onto Hammocks Beach Road off NC-17 near Swansboro, NC.
Drainage Area	Not applicable
USGS Hydro Unit	03020106
NCDWQ Subbasin	03-05-01
Project Size	0.3 acres brackish marsh and transitional freshwater wetland restoration
Restoration Approach	Remove deteriorating bulkheads. Mass earthwork, grading of wetland areas Construction of stone sills.
Date of Completion	August 2000
Monitoring Dates	November 2001, November 2003, November 2004

Results Summary

The site was found to be stable, ecologic communities developing, and vegetation healthy. The stone sills appeared stable, and no evidence of erosion was found. Marsh areas have developed well. Stem counts increased on average in marsh areas, but the height of lower marsh plants (*Spartina alterniflora*) was less this year. Transitional wetland and buffer areas also exhibited continued growth and recruitment. It appears that the goals of the site are being met. Unnecessary silt fences still remain and the reflectors could use some maintenance.

Table 2. Monitoring Results Table

Hammocks Beach Shoreline Stabilization and Wetland Restoration
Hammocks Beach State Park, Onslow County, NC
Fall 2004 Monitoring Data
10/18/2003

Marsh Transect Data

Transect 1 - East Side - Restroom Area				
Species	**Plot No.**	**Count**	**Height (m)**	**Cover (%)**
Spartina Alterniflora	1	120	0.3-1	30
	2	160	0.3-1	40
	3	145	0.3-1	35
Other	1	0	na	0
	2	0	na	0
	3	0	na	0
Spartina Patens	4	na	0.75-1.5	100

Transect 2 - West Side - Ramp Area				
Species	**Plot No.**	**Count**	**Height (m)**	**Cover (%)**
Spartina Alterniflora	1	113	0.75-1	60
	2	165	0.75-1	70
Other	1	12	0.3-0.5	1
	2	0	na	0
Spartina Patens	3	na	1.25-1.5	100

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1.0 BACKGROUND DATA

1.1 Introduction

The Hammocks Beach Shoreline Stabilization and Wetland Restoration Project involved the installation of innovative shoreline stabilization measures and the associated restoration of brackish marsh and transitional freshwater wetland buffer. The site doubles as a restoration area and as a demonstration of alternative shoreline stabilization techniques. The site is located at Hammocks Beach State Park near Swansboro, North Carolina.

1.2 Goals and Objectives

The primary goals of the project as stated on the NCWRP website are:

1) Restore spawning habitat for estuarine fish species.
2) Increase delivery of detritus to estuarine food web.
3) Provide buffer between developed areas of park and estuarine waters.
4) Provide demonstration of alternative to bulkhead construction for shoreline stabilization.

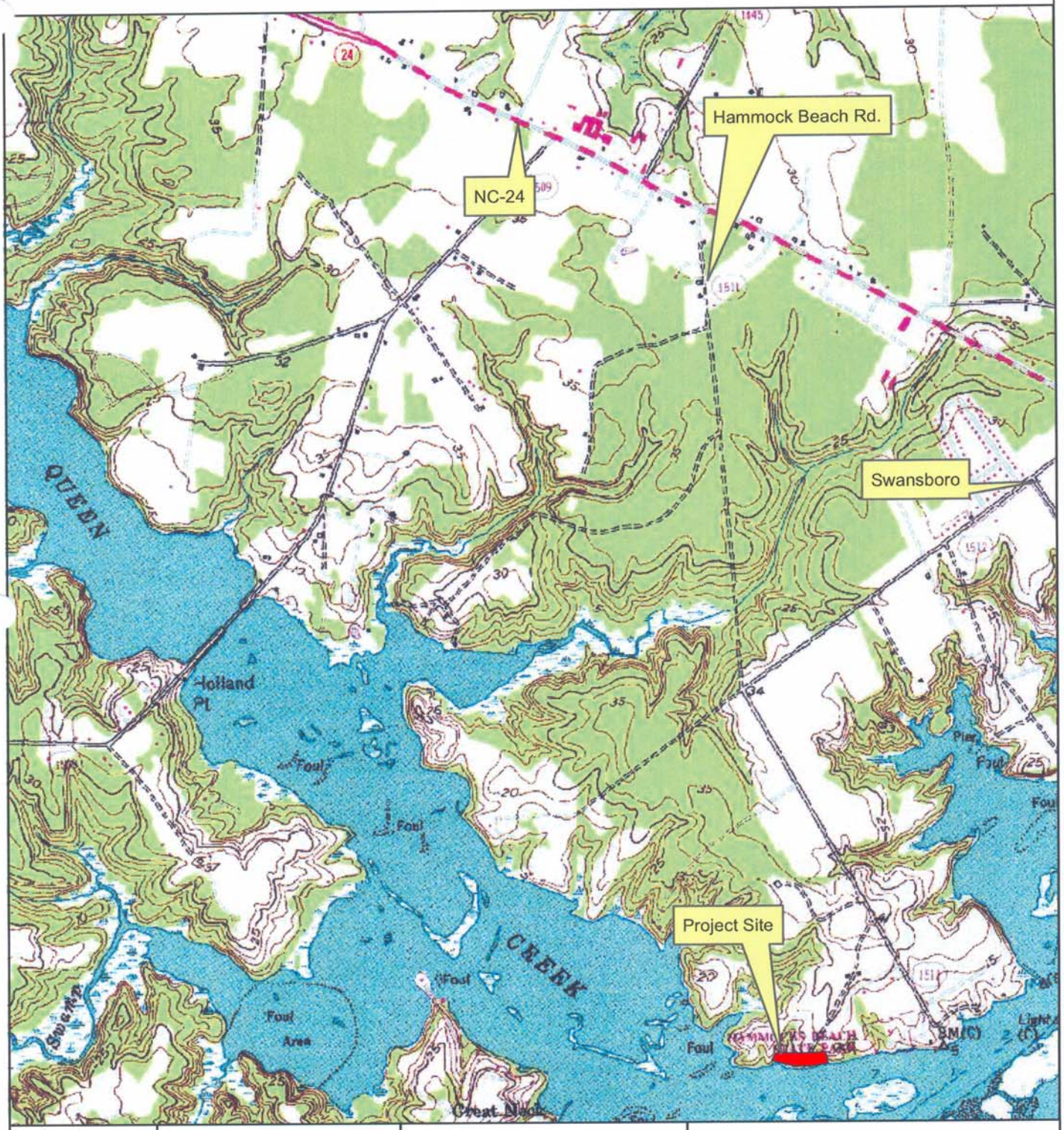
1.3 Design and Construction Background

Design and construction oversight services for this project were provided by Blue: Land, Water, Infrastructure, PA (BLWI). The site is located at the old parking lot and facilities for the park. There are two separate areas at the site. One of the areas is located adjacent to the picnic shelter and the other adjacent to the boat ramp area. Construction at the site began in early summer of 2000 and planting of the site was completed near the end of the same summer. Construction activities included the removal of two failing bulkheads, the installation of two stone sills/shoreline protection features, grading, and restoration of marsh areas. The primary wetland community types that were planted included brackish marsh and a salt shrub fringe. Brackish marsh areas were planted primarily with *Spartina alterniflora* (Smooth Cordgrass) and *Spartina patens* (Saltmeadow Cordgrass). Other communities included a variety of native plantings appropriate for design elevation and water chemistry conditions.

1.4 Monitoring Background

Two prior monitoring reports were provided for this project. Both monitoring visits were completed by Soil and Environmental Consultants, PA (S&EC). S&EC's monitoring focused on vegetative survival and involved stem counts and separation of stems into two height categories. Five plots ($0.5m^2$) were randomly located at both the restored and reference sites. Seed heads were also counted in the plots. The first monitoring visit was completed on November 27, 2001 and the second on November 27, 2002. The reports provided the ranges of stem counts and the raw data from the visits. Stem counts in the restored site ranged from 48-61 stems per plot. Counts in the reference site ranged from 53-93 stems per plot. S&EC staff indicated they expected increased recruitment and seed production over time at the site.

Location Map



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Hammocks Beach
Shoreline Stabilization
Wetlands Restoration

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1.5 Current Monitoring

NCSU staff made our initial monitoring visit on October 1, 2003. Our staff implemented a revised monitoring procedure developed based on the document "Draft Vegetation Monitoring Plan for NCWRP Riparian Buffer and Wetland Restoration Projects" provided by the North Carolina Wetlands Restoration Program. The new vegetation monitoring plan involves belted transects in the marsh areas and observations of community development in the fringe areas. Photographs and observations were also a part of the new monitoring agenda. An intermediary site visit was completed in the early summer of 2004 and a second full monitoring visit on October 18, 2004. The full monitoring plan is explained in detail in this report.

2.0 MONITORING PLAN AND RESULTS

2.1 Vegetation Monitoring Set up

As described in the "Draft Vegetation Monitoring Plan for NCWRP Riparian Buffer and Wetland Restoration Projects" document, belted transects were set up for recording vegetation density and survivability in the marsh areas. Due to the small size of this site, it was determined to set up random 1 meter x 1 meter plots at various intervals throughout the marsh. A total of five plots were set up in the lower marsh areas (*Spartina alterniflora*) and two plots were set up in the upper marsh areas (*Spartina patens*). PVC pipes set permanent and reproducible locations for vegetative plots.

Other vegetative communities at the site were found to be too small to justify additional plots. However, our staff visited each area to make observations on the health and development of those communities. The attached Vegetation Monitoring map shows the locations of the vegetation transects and plots.

Table 3. Vegetation Plots

Community Type	***Setup***	***Plots***	***Size (sq. meters)***
Brackish Marsh (lower)	Transects	5	1m
Brackish Marsh (upper)	Transects	2	1m

2.2 Vegetation Monitoring Results

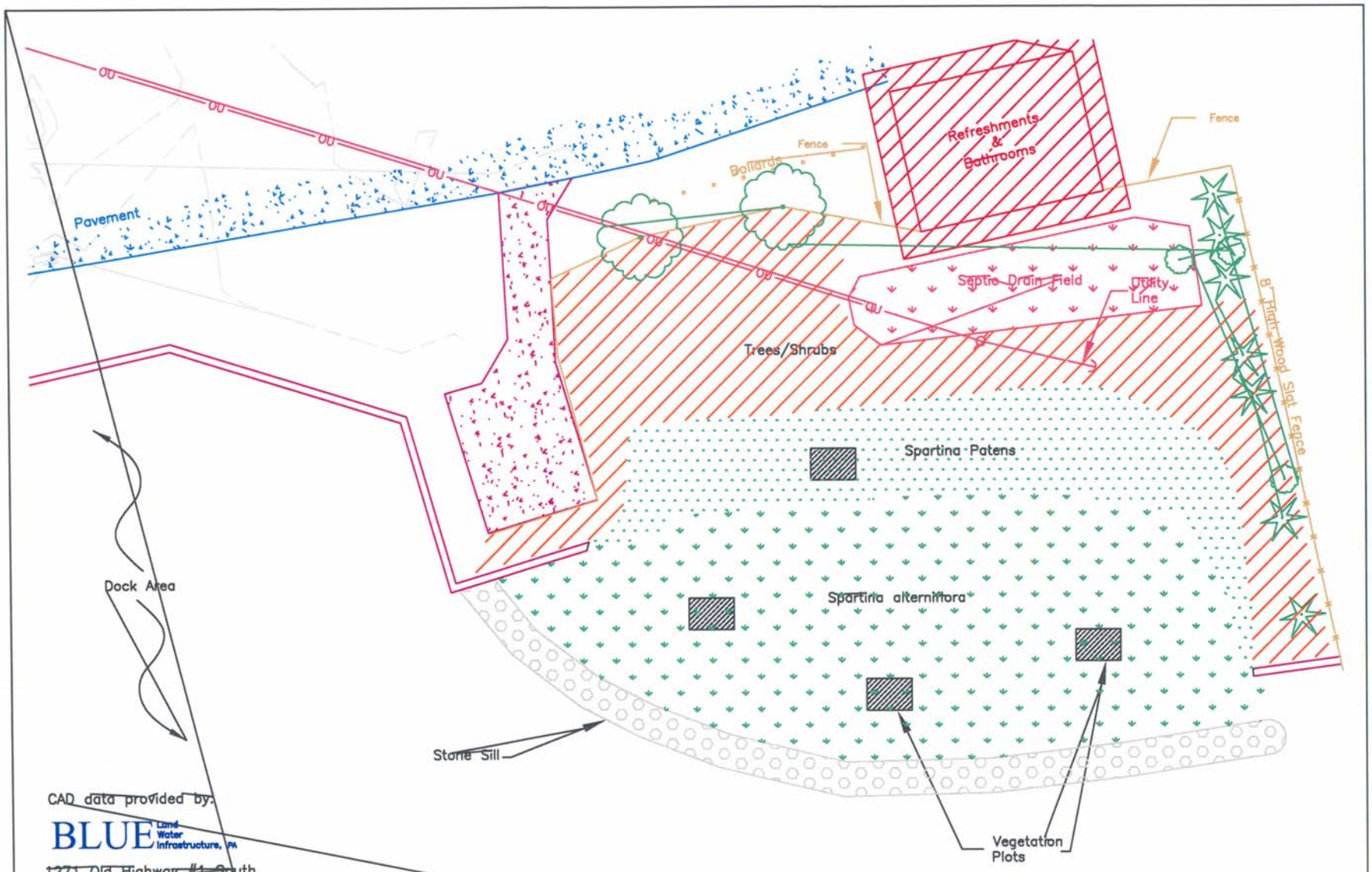
2.2.1 Brackish Marsh

Vegetation plots in the lower marsh areas revealed a healthy stand of *Spartina alterniflora* (Smooth Cordgrass). Total stem counts for *S. alterniflora* rose from 98 to 149 stems in 2003 to 113 to 165 stems in 2004. This increased the average stem count from 130 stems/plot to 140 stems/plot. During the 2003 monitoring visit, several species other than *S. alterniflora* were found in the plots. No other species were found in the marsh plots in 2004. The resulting plot totals exhibit an impressive increase in plant density when compared to the original planting density of 2.5 stems/plot. *S. alterniflora* ranged from 2-3.5 feet tall in 2003, with a few stems rising to 5 feet. However, in 2004, stems heights were found to be slightly lower, with heights ranging between 0.75-3 feet. Coverage ranged between 30-70% of the surface area of the plots with an average of nearly 50% coverage.

As in 2003, upper marsh plots revealed extremely dense stands of *Spartina patens* (Saltmeadow Cordgrass). The number of stems in each plot were too numerous to count. Vegetation in these plots covered 100% of the ground surface beneath them. *S. patens* stems ranged from 2-4 feet in height. Several volunteer species were observed in upper marsh areas, but did not seem to threaten the coverage of *S. patens*. Species such as cattails, morning glory, pennywort, and some juncus were found.

2.2.2 Other Vegetation Observations

Transitional wetland/buffer areas were planted with *Ilex vomitoria* (Youpon Holly), *Quercus virginiana* (Live Oak), *Ilex glabra* (Inkberry), and *Myrica cerifera* (Wax Myrtle). These trees and shrubs were found to be growing well and very few of the planted species were not found to be alive. Wax Myrtle is showing robust growth and has propogated around the site in several places. The fringe area on the boat ramp side is healthy, but has only exhibited moderate growth



CAD data provided by:

BLUE Land Water Infrastructure, PA

1271 Old Highway #1 South
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Monitoring Locations Map

East Side – Restroom Area
Hammocks Beach
Shoreline Stabilization and Wetlands Restoration Project

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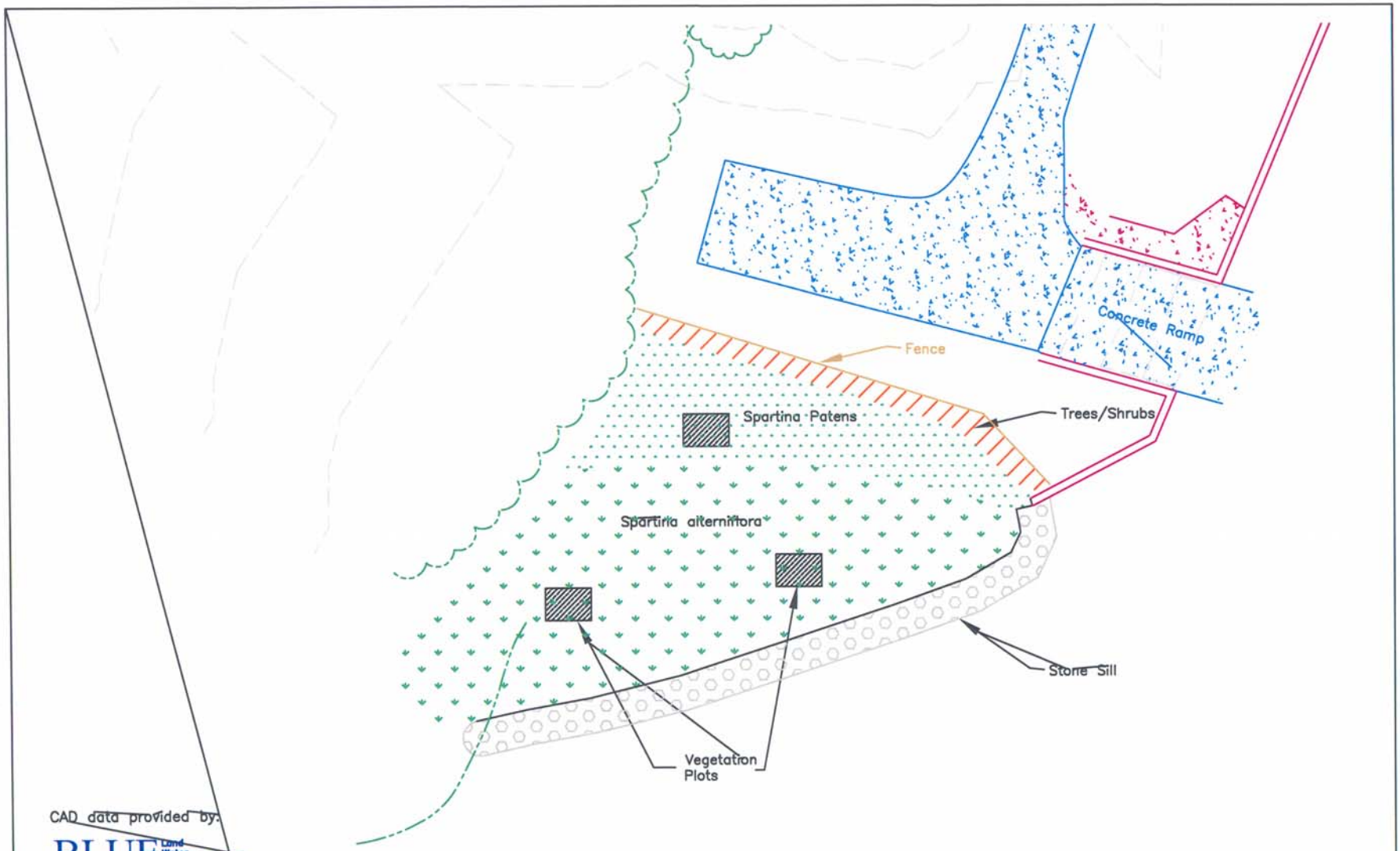

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Monitoring Locations Map

West Side – Ramp Area
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2.4 Results Discussion

Vegetation survivability and coverage is exceeding the success criteria at this site. It is expected that the lower marsh will continue to develop. Freshwater inputs to the site from the surrounding parking lots seems sufficient to support the intrusion of some freshwater species in the upper marsh. It appears a substantial population of *S. alterniflora* has developed and will continue to be stable. The encroachment of undesirable vegetation in the lower marsh does not seem to be a problem, but the upper marsh area may need to be watched to ensure competition does not overwhelm *S. patens*. The continued spread of wax myrtle in the upper portions of the site may create a competitive situation for the other, larger tree species. It may be necessary to manage the wax myrtles if a more diverse tree population is desired. The stone sills/shoreline protection structures appear stable and no problems with movement or subsidence were found. The installed reflectors appear solid, however, the reflective tape has been faded since the first visit in 2003. The tape may need replacement or other markings should be added if boat traffic is anticipated. It does not appear that the recommendations from the 2003 monitoring report have been addressed in any way.

3.0 PHOTOGRAPHS

Photo 1. Picnic Shelter side. Upper and lower marsh boundary.

Photo 2. Restroom side marsh.

Photo 3. Ramp side marsh.

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Photo 4. Upper marsh areas.

Photo 5. Restroom Side marsh.