

MANAGEMENT PLAN

Cocoa Beach's
Maritime Hammock Preserve
City of Cocoa Beach, Florida

Florida Communities Trust Project No. 03 – 035 –FF3



Adopted March 18, 2004

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I. INTRODUCTION

The City of Cocoa Beach's Maritime Hammock Preserve is a unique site within this largely urbanized area of the City. The project site is within the boundaries of two priority investment areas – the Indian River Lagoon National Estuary Program and the Indian River Lagoon Scenic Highway Corridor. Located just north of the intersection of North Atlantic Avenue (SR A1A) and Cocoa Isles Boulevard, the project site includes a remnant of the marine hammock community once found throughout the Cocoa Beach area. Statewide, the maritime hammock community has been identified by the Florida Natural Areas Inventory as an “imperiled” community. This plant community comprises approximately sixty percent of this 5.4-acre site. The project location map is shown in Exhibit A.

While remnants of a maritime hardwood hammock are found on the project site, much of the property was cleared at some point in the past. Typical hammock understory species are still found on the project site; however they generally occur as individual specimens rather than as part of a cohesive community. Much of the project site has been mowed for many years, preventing regrowth of these species. However, in areas not mowed, Brazilian pepper (*Schinus terebenthifolius*) and Australian pine (*Casuarina* sp.) often invaded and formed dense thickets.

Wildlife present on the site includes a variety of small mammals and reptiles and a number of birds. Bird species noted on-site include listed species such as white ibis (*Eudocimus alba*) and osprey (*Pandion haliaetus*). Many of the species present are typical of those found in old field habitats. Feral animals (specifically cats) may be present on the site (*from time to time*).

To date, no archaeological or historic resources have been identified on the project site; however, there are identified archaeological sites nearby. The location of the site near the Atlantic Ocean and the Banana River may increase the potential for the presence of archaeological resources. Although the project site was cleared in the past and regularly mowed, some artifacts may remain onsite. An archaeological survey will be conducted prior to any development activities on the project site.

The City of Cocoa Beach submitted an application to the Florida Communities Trust in June 2003. Grant funds received from Florida Communities Trust in 2004 will reimburse the City for a portion of the costs of acquiring the project site. This management plan has been developed to ensure that the project site will be managed in accordance with the Grant Award Agreement and in furtherance of the grant application.

The management plan includes a conceptual master site plan, management objectives for the project site, and goals and objectives from the City's comprehensive growth management plan that are related to the management of the project site. Physical improvements planned for the project site were reviewed to identify any permits required to implement proposed land alterations during construction of any improvements. Other items reviewed in the management plan include:

- Proposed improvements,
- easements, concessions, and lease agreements,
- proposed resource management and restoration activities,
- archeological, historical and cultural resources assessment and protection,
- greenway management and connectivity,
- maintenance, security and staffing.

A cost estimate to implement the management plan was prepared based on the items reviewed above and priorities selected from elements of the plan. Provisions for monitoring the health of the natural resources and for measuring progress in implementing the management plan will be documented as well.

II. PURPOSE

The purpose of this project as described in the Florida Communities Trust Program application package reads as follows:

The purposes of this project include the provision of additional public green space within the City, restoration and preservation of the natural communities and habitats at the project site while providing compatible passive, low-impact recreational opportunities for the public.

a. Future Uses

The future uses of the project site are for conservation and passive recreation. The project site will be managed in perpetuity only for the conservation, protection and enhancement of natural resources and for public outdoor recreation that is compatible with the conservation, protection and enhancement of the site. Accordingly, the City's future land use and zoning designation for the project site has been amended to conservation. In addition, the project site will be identified in all literature and advertising as being publicly owned and operated as a natural conservation area. These materials will also state that the project site was acquired with funds from the Florida Communities Trust.

b. Management Objectives

To achieve these purposes, several management objectives for the site are proposed. These include:

- Implementing management (removal/control) of exotic, invasive or undesirable species.
- Designing, constructing and maintaining a landscape plan that will serve to protect, preserve, and restore the maritime hammock community and include native species in the landscape components
- Designing, constructing and maintaining a conservation area with amenities such as benches, restrooms, picnic tables, walking/exercise paths, bike racks, educational signage, a water feature/stormwater pond and wildlife viewing platform, which are compatible and consistent with protection and restoration of the natural communities on the project site.

c. Major Comprehensive Plan Directives

Future Land Use Element

Objective I.5

To maintain or improve the current quality of natural and historic resources.

Conservation Element

Objective IV.3

To conserve, appropriately use and protect native vegetative communities, fisheries, wildlife and wildlife habitat.

Objective IV.8

To designate environmentally sensitive lands for protection based on State and locally determined criteria.

Sanitary Sewer, Solid Waste, Stormwater Management, Potable water, Natural Groundwater & aquifer Recharge Element

Objective VI-D.1

The City of Cocoa Beach shall, effective with the adoption of the Comprehensive Plan, strive to provide for adequate stormwater management in both flood control and water quality to meet the future needs of the City of Cocoa Beach.

Recreation and Open Space Element

Objective VII.3

To ensure that parks and recreation facilities are efficiently and effectively provided.

III. SITE DEVELOPMENT, IMPROVEMENT AND ACCESS

a. Existing Physical Improvements

No structures or other facilities are present on the project site. With the possible exception of clearing of portions of the site and regular mowing, no improvements have been made to the project site. A public utility easement strip, approximately forty feet in width, exists along the west side of the property and runs north from Cocoa Isles Boulevard to Holiday Lane. Collection lines for the City's sanitary sewer and distribution lines for the City's reclaimed water are located within this easement.

b. Proposed Physical Improvements

Consistent with the intended use of the project site as a conservation area, facilities anticipated to be constructed on the site are few. Anticipated facilities include a parking area, a restroom, water feature/stormwater pond, wildlife observation deck, recreational trails or paths, benches, picnic tables, and educational signage or kiosks.

The parking area will be located at the southwest portion of the preserve where there is currently an entranceway from Cocoa Isles Boulevard. The restroom will be located adjacent to the parking area at the preserve's entrance. Since the preserve is to be low impact and is readily assessable by walking, bike and public transportation, parking will be limited to ten vehicles. Parking will be grassed and denoted by wooden curb stops. Bicycle racks will be constructed at the parking area.

The stormwater pond will be approximately one acre and will be placed to assure preservation of all valuable habitat on the project site. A wildlife observation deck will be a user amenity to the pond. It will be approximately forty feet in diameter and will include seating and educational kiosks on the relationship between stormwater runoff and the Indian River Lagoon and coastal

habitat. A small maintenance shed will be located along the west easement area, which will house the facilities for alum treatment of the storm runoff. This structure will be approximately eight feet square and, as an alternative, may be designed as an underground chamber. If this structure is built above ground, the design will be rustic in nature to blend with the forested surroundings.

Trails will be approximately a quarter mile in length and will include a nature trail with educational signage and a seven-station fitness loop for users desiring more aerobic recreation. The pond area will include a few picnic tables designed for seating six persons. A tetherball area will be located at the northern fringe of the project site, along the fitness trail, where an existing restaurant precludes the peacefulness found in the other forested areas. A picnic table will be located in the vicinity of the tetherball area. A large entry sign at the Cocoa Isles Boulevard entrance at or near the parking lot will give the history of the maritime hammock and its functionality as coastal habitat for migrating birds and resident wildlife. This sign will inform visitors of the partnership between the City and State for the preservation of this green space. An entry sign will be placed on SRA1A where a bicycle rack and bench will be located. Approximately eight trash receptacles will be placed at the project site, predominantly at the stormwater pond, observation deck, entries and tetherball/exercise area. It is anticipated that stormwater management infrastructure will be constructed in the western border easement in conjunction with the stormwater pond proposed for the project site. All improvements will be placed to compliment the forested areas without disturbing existing native vegetation.

All improvements to the project site will be listed in this management plan. Any proposed modification to this plan and/or alterations or physical improvements not listed explicitly in this management plan requires FCT review and approval prior to any action.

c. Wetland Buffer

No wetlands currently exist on the project site and there is no evidence that wetlands were historically present on the site. A one-acre water feature/stormwater pond will be created on the project site. This pond will have a sinuous shoreline, resembling a natural pond. The shoreline and adjacent area will be landscaped with native plants to provide water quality and habitat benefits, and to provide a safety buffer between the pond and recreational activities. Appropriate setbacks (10' from a mulched path, 25' from a paved path) will be maintained from these constructed wetlands.

d. Acknowledgement Sign

Following execution of the management agreement, a sign will be placed along North Atlantic Avenue (SR A1A) informing passersby that the City of Cocoa Beach and Florida Communities Trust acquired the project site in 2004 as public lands. The sign will also alert the community that restoration activities and construction of facilities will commence on the project site in the near future. Longer term, a permanent sign will be installed along North Atlantic Avenue which will identify the project site as a City of Cocoa Beach preserve, acquired and developed in partnership with Florida Communities Trust.

A permanent sign will also be placed at or near the parking area identifying the project site as a City of Cocoa Beach preserve, acquired and developed in cooperation with Florida Communities Trust. It is anticipated that this sign will also contain information about facilities available on the project site, allowed and prohibited activities, hours of operation and similar information.

e. Parking

Parking for the project site will be located in a presently cleared and mowed area at the access from Cocoa Isles Boulevard. Six spaces including a handicapped parking spot will be provided. A bike rack and trash receptacle will be provided at or near the parking area. The parking area will not be paved as grass or some form of pervious stabilization such as turf blocks or Geoweb will be used. Drainage from the parking area will be directed to the stormwater pond.

f. Stormwater Facilities

A water feature/stormwater treatment pond approximately one acre in size will be located in the southern portion of the project site. The pond will have a sinuous shoreline, resembling a natural pond and will not be fenced. The pond will have shallow slopes and will contain a littoral zone planted with native vegetation such as spartina, pickerel weed and arrowhead to provide both water quality and habitat benefits. It is anticipated that this pond will draw wildlife such as wading birds to the project site. No native hardwood species will be removed in construction of the pond. The exact shape and size of the pond will be subject to engineering design constraints.

In addition to being wildlife habitat and an aesthetic amenity, the pond will treat stormwater from the project site as well as providing offline treatment for stormwater from an 81-acre watershed that currently discharges to the Banana River with minimal treatment. Stormwater treatment will be enhanced with alum injection, a technology recommended by FDEP's Nonpoint Source Management Section. Grant monies for design and construction of the stormwater treatment pond have been awarded by FDEP (Florida Department of Environmental Protection) and SJRWMD (St. Johns River Water Management District).

g. Hazard Mitigation

The entire land area of the City of Cocoa Beach is subject to flooding and is completely within the designated hurricane vulnerability zone and coastal high hazard area. Through acquisition of the project site and its designation as conservation area/passive recreational park, the potential for additional development in these zones has been eliminated.

The stormwater pond will serve not only to improve water quality in the nearby Banana River through treatment of stormwater but will also serve to alleviate flooding in nearby areas.

h. Permits

Permits will be required from the St. Johns River Water Management District for the construction of the stormwater treatment pond at the project site. Permits for similar projects are typically issued in less than 90 days. Site plan review for the project as a whole will be required by the City of Cocoa Beach as will building permits for several aspects of site development. A National Pollutant Discharge Elimination System (NPDES) construction permit will be required for the construction activity of the stormwater pond.

i. Easements, Concessions, and Leases

An existing 41-foot utility easement borders the project site in the west (see Exhibit A – Master Site Plan). Sanitary sewer transmission lines and reclaimed water distribution lines are presently located underground within this easement. It is anticipated that stormwater management facilities

will be constructed in this easement to assist in the conveyance and treatment of the storm runoff. The stormwater infrastructure will be located underground within this utility easement.

No concessions or leases have been identified or are proposed on the project site. Should concessions, leases or additional easements be considered at some future time any such easement, lease, or concession shall be compatible with the purposes and management objectives of this management plan. In the event that a lease, concession or additional easement is considered for the project site, the City of Cocoa Beach will provide 60 day prior notice and information regarding the lease of any interest, the operation of any concession, any sale or option, the granting of any management contracts, and any use by any person other than in such person's capacity as a member of the general public. Prior to the execution of any such document, a review and approval by FCT will be required. Any and all fees collected from any easement, concession, or lease will be placed in a segregated account and go for the upkeep and maintenance of the project site.

IV. NATURAL RESOURCES

a. Natural Communities

The project site, appropriately named the Maritime Hammock Preserve, is comprised of remnant coastal hammock and cleared areas that were planted with citrus in the early 1900s. As is common with ruderal areas, the cleared portions became infested with invasive vegetation such as Brazilian pepper and Australian pine. In the undisturbed hammock areas, typical canopy and understory species endure, providing anchors for ecosystem restoration.

As used in Florida, the term *hammock* generally refers to an area of vegetation that is distinct from its surroundings. This distinction can arise from differences in vegetation, or from a change in topography setting the area apart as either higher or lower than its surroundings. In Brevard County, coastal hammock usually occurs where the physical stresses of the dune zone diminish to the point where a stable forest can grow.

The original vegetation of Cocoa Beach probably consisted of patches of palmetto scrub (*Serenoa repens*) and coastal hammock dominated by a canopy of live oak (*Quercus virginiana*) with a mixed understory consisting of temperate and subtropical species. Remnants of the oak hammock (including some specimens with DBH > 30") still exist in Cocoa Beach, and tropical hammock species can still be found associated with shell middens in the Thousand Islands area of Cocoa Beach.

Coastal plant community makeup is most likely controlled by substrate composition, and disturbances such as storms, fire and infrequent freezes. Calcareous substrates resulting from shell middens and relict beach deposits ameliorate soil acidity and improve drainage, and are often colonized by tropical plants, either as understory or sub-canopy vegetation (Johnson and Barbour, 1990), (Norman, 1976). Where the disturbance regime is less severe the canopy is comprised of live oak with other large trees such as red bay (*Persea borbonia.*), red mulberry (*Morus rubra*), hackberry (*Celtis laevigata*) and strangler fig (*Ficus aurea*).

In certain places within Cocoa Beach, hammock vegetation extends completely to the lee side of the dune e.g. Lori Wilson Park. In other areas, the backdune vegetation is comprised of palmetto/oak scrub as a transition zone between the dune and the hammock. Examples of this transition vegetation can be seen at Archie Carr National Wildlife Refuge and Canaveral

National Seashore. Mature hammock vegetation can be seen at the Castle Windy area of Canaveral National Seashore, with relicts occurring at Lori Wilson Park and elsewhere in Cocoa Beach. These areas provide excellent examples of a restoration target for the project site.

Animal species noted on-site include the following. Reptiles: black racer (*Coluber constrictor*), anoles (*Anolis carolinensis*, *A. sagrei*). Birds: numerous neo-tropical migrants, resident passerines and some raptors. Mammals: evidence of raccoons.

The canopy will provide an area to feed as well as rest for the neo-tropical migrant birds. This in turn, will provide a hunting area for potential use by migratory raptors such as the merlin (*Falco columbarius*). Use by animals is likely to increase as restoration of vegetation takes place.

Literature Cited:

Johnson, A. F. and M. G. Barbour. 1990. Dunes and maritime forests. *In*: R. L. Myers and J. J. Ewel (editors). *Ecosystems of Florida*. Univ. of Central Florida Press, Orlando. Pp. 429-480.
 Norman, E. M. 1976. *An analysis of the vegetation at Turtle Mound*. *Fl. Sci.* 39(1):14-18.
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b. Listed Animal Species

**Table IV.a
Project Site Animal Species Observed (On/Adjacent)**

CLASS	SPECIES	HABITAT
Reptiles	Black Racer (<i>Coluber constrictus priapus</i>)	Hammock
	Green Anole (<i>Anolis carolinensis</i>)	Hammock
	Cuban (Brown) Anole (<i>Anolis sagrei</i>)	All
Birds	Six-lined Racerunner (<i>Cnemidorphus sexlineatus</i>)	Palmetto
	Cattle Egret (<i>Bubulcus ibis</i>)	All
	Wood Stork (<i>Mycteria americana</i>)	Open areas
	White Ibis (<i>Eudocimus albus</i>)	Open areas
	Passerines	Red-bellied woodpecker (<i>Melanerpes carolinus</i>)
	Yellow-bellied sapsucker (<i>Sphyrapicus varius</i>)	Snags, trees
	Pileated woodpecker (<i>Dryocopus pileatus</i>)	Snags, trees
	Brown Thrasher (<i>Toxostoma rufum</i>)	Hammock
	Gray (Crested) Kingbird (<i>Tyrannus dominicensis</i>)	Hammock
	Northern Cardinal (<i>Cardinalis cardinalis</i>)	Hammock
	Northern Mockingbird (<i>Mimus polyglottos</i>)	Hammock
	Blue Jay (<i>Cyanocitta cristata</i>)	Hammock
	Fish crow (<i>Corvus ossifragus</i>)	All
	Neotropical migrants (several)	Hammock
	Doves (several)	Ground
Raptors	American Kestrel (<i>Falco sparverius</i>)	Trees
	Osprey (<i>Pandion haliaetus</i>)	Trees, snags
	Red Shouldered Hawk (<i>Buteo lineatus</i>)	Trees
	Merlin (migratory) (<i>Falco columbarius</i>)	Trees
	Peregrine falcon (migratory) (<i>Falco peregrinus</i>)	Trees
Mammals	Raccoon (<i>Procyon lotor</i>)	Hammock
	Opossum (<i>Didelphis virginiana</i>)	Hammock
	Gray squirrel (<i>Sciurus carolinensus</i>)	Hammock

Endangered, Threatened, Species of Special Concern, EPPC Invasive

c. *Listed Plant Species*

Table IV.b
Project Site Plant Species List

Family	Genus/species	Common Name
Anacardiaceae	<i>Shinus terebinthifolius</i> <i>Toxicodendron radicans</i>	Brazilian Pepper Poison Ivy
Apocynaceae	<i>Catharanthus roseus</i>	Periwinkle
Araliaceae	<i>Schefflera actinophylla</i>	Queensland Umbrella Tree
Arecaceae	<i>Sabal palmetto</i>	Sabal Palm
Asteraceae	<i>Ambrosia artemisiifolia</i> <i>Bidens alba</i> <i>Erigeron strigosus</i> <i>Eupatorium compositifolium</i> <i>Mikania scandens</i> <i>Solidago sempervirens</i> <i>Wedelia trilobata</i>	Common Ragweed Beggarticks Daisy Fleabane Dog Fennel Climbing Hempweed Seaside Goldenrod Creeping Oxeye
Boraginaceae	<i>Heliotropium angiospermum</i>	Scorpion's Tail
Bromiliaceae	<i>Tillandsia recurvata</i>	Ball Moss
Burseraceae	<i>Bursera simaruba</i>	Gumbo-Limbo
Caricaceae	<i>Carica papaya</i>	Papaya
Casuaraceae	<i>Casuarina glauca</i>	Australian Pine
Commelineaceae	<i>Commelina erecta</i>	Whitemouth Dayflower
Convolvulaceae	<i>Ipomoea sp.</i>	Morning Glory
Curcubitaceae	<i>Melothria pendula</i> <i>Momordica charantia</i>	Creeping Cucumber Southern Balsmpear
Dioscoreaceae	<i>Dioscorea bulbifera</i>	Air Potato
Euphorbiaceae	<i>Chamaesyce bombensis</i> <i>Chamaesyce hirta</i> <i>Chamaesyce hypericifolia</i> <i>Ricinus communis</i> <i>Sapium sebiferum</i>	Sand-Dune Hairy Spurge Graceful Sandmat Castor bean Chinese Tallow
Fagaceae	<i>Quercus virginiana</i>	Live Oak
Lauaceae	<i>Persea borbonia</i>	Red Bay
Malvaceae	Malvaviscus sp. <i>Sida sp.</i>	Turk's Cap Mallow Fanpetals

Family	Genus/species	Common Name
Moraceae	<i>Ficus aurea</i>	Strangler Fig
	<i>Morus rubra</i>	Red Mulberry
	<i>Ficus sp.</i>	Banyan Tree
Myrsinaceae	<i>Ardisia escallonioides</i>	Marlberry
Myrtaceae	<i>Eugenia uniflora</i>	Surinam Cherry
Oleaceae	<i>Forestiera segregata</i>	Florida Swampprivet
Onagraceae	<i>Oenothera humifusa</i>	Seaside Evening Primrose
Poaceae	<i>Cenchrus sp.</i>	Sandspur
	<i>Dactyloctenium aegypticum</i>	Crowfoot Grass
	<i>Panicum maximum</i>	Guinea Grass
	<i>Paspalum notatum</i>	Bahiagrass
	<i>Stenotaphrum secundatum</i>	St. Augustine Grass
Polygalaceae	<i>Polygala grandiflora</i>	Showy Milkwort
Portulacaceae	<i>Portulaca pilosa</i>	Pink Purslane
	<i>Hedyotis corymbosa</i>	Flattop Mille Grains
Rubiaceae	<i>Psychotria nervosa</i>	Wild Coffee
Sapindaceae	<i>Cupaniopsis anacardioides</i>	Carrotwood
Smilacaceae	<i>Smilax sp.</i>	Car Briar
Solanaceae	<i>Physalis walteri</i>	Groundcherry
Verbenaceae	<i>Callicarpa americana</i>	Beautyberry
	<i>Lantana camera</i>	Lantana
	<i>Lantana involucrata</i>	Lantana
	<i>Phyla nodiflora</i>	Carpetweed, Frog-Fruit
	<i>Vitex sp.</i>	Chaste Tree
Vitaceae	<i>Ampelopsis arborea</i>	Peppervine
	<i>Parthenocissus quinquefolia</i>	Virginia Creeper
	<i>Vitis aestivalis</i>	Summer Grape
	<i>Vitis shuttleworthii</i>	Calusa Grape
	<i>Vitis rotundifolia</i>	Muscadine Grape

Endangered, Threatened, Species of Special Concern, EPPC Invasive, non-native

d. Inventory of Natural Plant Communities

The only natural plant community existing on the project site is the maritime hammock. A portion of the site will be used as a stormwater pond with a littoral vegetated zone for habitat enhancement and stormwater nutrient removal. This small portion of the site will function as a man-made treatment pond nestled in a natural hammock setting and will resemble one of the coastal lake natural communities. It is expected that this pond will attract wading birds such as snowy egrets (*Egretta thula*), little blue herons (*Egretta caerulea*) and tricolor herons (*Egretta tricolor*). It is expected that this pond area will enhance the hammock for migratory bird species and beneficial insects such as dragonflies. No adverse impacts to the primary hammock habitat are anticipated.

e. Water Quality

While no waterbodies currently exist on the project site and there is no evidence that a waterbody was present historically on the site. A water feature/stormwater treatment facility approximately one acre in size will be located at the south end of the project site in an area that has been cleared and regularly mowed. The pond will have a sinuous shoreline, resembling a natural pond. The shoreline and adjacent area will be landscaped with native plants to provide both water quality and habitat benefits.

In addition to being potential habitat and an aesthetic amenity, the pond will treat stormwater from the project site as well as providing offline treatment for stormwater from an 83-acre watershed, which is currently discharged, to the Banana River with minimal treatment. Funding for this portion of the project has been obtained from Florida Department of Environmental Protection (FDEP) and St. Johns River Water Management District (SJRWMD).

This segment of the Banana River is presently included on the FDEP Section 303(d) list of impaired waters, primarily due to excess nutrients. Total maximum daily loads (TMDLs) will be established for the Banana River to address impairment. Water quality projects such as this stormwater pond will help meet TMDLs and improve water quality in the Banana River.

f. Unique Geological Features

Not Applicable

g. Trail Network

The project site will include a combination fitness and nature trail. The fitness trail will be a segment of the nature trail and will include various exercise stations that will allow visitors to work out on a challenging course. The nature trail, which is geared for more passive recreation and education, will wind throughout the project site along the water feature/stormwater pond and through the maritime hammock community. The nature trail will include informational signage at several points discussing the communities and their role in the coastal ecosystem, identifying various plants, discussing the purpose and function of the water feature/stormwater pond and discussing restoration activities underway on the project site.

Several State and local programs support the establishment of trails for walking or bicycling linking sites within a corridor. The project site is located along the Brevard County MPO SR

A1A Urban Trail, which runs from Port Canaveral to Sebastian Inlet, distance of more than 40 miles (See Exhibit E – SRA1A Urban Trail). The project is also located along the Indian River Lagoon Scenic Highway, which runs along SR A1A from Port Canaveral to Wabasso Causeway (SR 510) and along US 1 from Wabasso to Titusville. This project will enhance the trail network by providing trailside facilities and a destination along this trail system.

h. Greenways

Within the Indian River Lagoon system basin there are “official” greenways programs such as those implemented by the Florida Department of Environmental Regulation’s (FDEP) Office of Greenways and Trails, the Brevard County Metropolitan Planning Organization (MPO), “unofficial” greenways programs such as the Indian River Lagoon Greenway supported by the Marine Resources Council, a local private interest group, and related programs such as Indian River Lagoon Blueway Project, a consortium of the SJRWMD, SFWMD, and the counties within the Indian River Lagoon basin seeking to acquire and manage wetland areas along the Indian River Lagoon, and the Indian River Lagoon Scenic Highway, a program sponsored by FDOT to protect and restore natural and scenic resources along the Lagoon.

Each of these programs supports the protection of green areas to function as corridors for wildlife migration or as a network of refuges. Many of these programs also support public use of greenways parcels as passive parks, affording a refuge from the hustle and bustle of everyday life. While each of these programs has their own set of goals and objectives, they are consistent with and complimentary to the purposes and objectives established for the project site. In addition to coordinating activities with these programs, it is anticipated that the advice, support and partnership of these programs will be sought in implementating this management plan.

V. RESOURCE ENHANCEMENT

a. Upland Restoration

The natural community on the project site has been impacted by previous activities and requires substantial enhancement and restoration. As previously noted, much of the project site was cleared and much of the property was regularly mowed for many years. Many areas, which were not regularly mowed, now support dense growth of Brazilian pepper or Australian pine. The restoration portion of the site is approximately 2 acres.

Initial restoration and enhancement efforts are anticipated to focus on removal or control of exotic species as identified in the Exotic Pest Plant Council’s publication *List of Florida’s Most Invasive Species*. The primary focus of this effort will be control and phased removal of Australian pine and Brazilian pepper. Following removal of the exotic species, part of the ongoing maintenance activities at the project site will be monitoring to insure that these or other exotic or undesirable plants do not re-establish within the project site.

Once the majority of the exotic, invasive or undesirable plants have been removed or are under control in a particular area, restoration of the area will commence. Restoration of the maritime hammock community on site will be a gradual, long-term process. While a number of trees and palms remain on-site, most of the understory has been eliminated by clearing and mowing. Considering the extent of the area to be restored and the complexity of the community to be

restored, it will likely be several years before the natural community on the project site resembles a mature and functional maritime hammock. It is anticipated that the restoration process will involve a series of small to moderate sized projects undertaken over several years. The number and size of these projects accomplished each year will likely be based on the availability of funding and labor available.

All proposed landscaping and restoration areas will be planted with native plant species typical of the maritime hammock community or coastal areas. Landscape materials in the vicinity of the observation deck, picnic areas and parking will consist of native species such as saw palmetto (*Serenoa repens*), sea grape (*Coccoloba uvifera*), beautyberry (*Callicarpa americana*), coontie (*Zamia pumila*) and similar coastal plants. This area includes approximately 1 acre or 18% of the project site. Landscape for these highly visible areas will be accomplished within a year after the completion of the stormwater pond, which is expected to be complete within three years.

Plant materials to be used in restoration of the maritime hammock will include species documented in the well-preserved remnant of maritime hammock at nearby Lori Wilson Park (*Lori Wilson Park Flora Taxa List*; Hames & Zarillo, 1994) or in maritime hammocks found on the Kennedy Space Center (*Flora and Threatened and Endangered Plants of the John F. Kennedy Space Center*, NASA Technical Publication Memorandum 102791, 1990). These species include sabal palm (*Sabal palmetto*), hardwoods such as live oak (*Quercus virginiana*), redbay (*Persea borbonia*), red cedar (*Juiperus silicicola*), gumbo limbo (*Bursera simaruba*); and shrubs or herbaceous understory plants such as wild coffee (*Psychotria nervosa*), marlberry (*Ardisia escalloidides*), Simpson's stopper (*Myrcianthes fragrans var. simpsonii*), tough bully (*Sideroxylon tenax*), and numerous others. The hammock restoration is the largest area for landscaping – approximately 3 acres or 55% of the project site. Initial improvements will be exotic plant elimination and encouragement of existing native species and volunteers. Once all exotics are removed, areas will be prioritized and a diverse array of suitable species will be planted. A few open areas will be left and planted as wildflower habitat to encourage proliferation of our coastal butterflies and beneficial insects. The anticipated schedule for exotic removal is ten years with most areas being addressed within five years. Suitable hammock vegetation will be planted within the restoration areas within seven years. Wildflower areas will be planted within the first three years.

Restoration is anticipated to be accomplished using several strategies. In some areas, the strategy will be to simply cease mowing a selected part of the site. If an adequate seed bank remains after years of mowing, this may allow native understory species to return. The restoration areas will be monitored, species present noted, and invasive or undesirable species removed. The success or failure of this strategy is likely to vary widely from area to area. As a result, it is likely that supplemental plantings will be required to provide the mix and coverage of plant species typically found in the maritime hardwood hammock community.

Other portions of the site may simply be planted with a mix of native sub-tropical hardwood hammock species such as palmetto, wild coffee, live oak, bay, gumbo limbo, nakedwood, Hercules club and similar species. Planting success will be monitored and invasive and other undesirable plants removed.

Another strategy will be to use this property as a “receiver” location for plants that otherwise may be lost to development. Some vacant lots within the City and adjacent areas have remnants of the maritime hammock community. As these lots are developed, appropriate plants will be salvaged and transplanted to the project site as part of the enhancement and restoration process. Another strategy the City may employ for hammock restoration is development of a plan to sell memorial trees (suitable hammock species) to its citizens for planting in the preserve.

Restoration activities have already commenced upon the project site with vast numbers of Brazilian pepper and Australian pine eradicated from the eastern portion. Suffocating vines have been herbicided, allowing the valued hardwoods underneath them to re-leaf and flourish. It is evident that oak, Florida privet and wild coffee are already beginning to revegetate this area of the site. It is anticipated that five years, at a minimum, will be needed to introduce a significant number of maritime hammock species to the project site. It is anticipated that ten (10) to fifteen (15) years will be needed to phase out all of the Australian pine on the property and to transition these affected areas into a functional hammock community.

b. Wetland Restoration

While no wetlands currently exist on the project site and there is no evidence that wetlands were historically present on the site, a water feature/stormwater treatment facility approximately one acre in size will be located at the south end of the project site in an area that has been historically cleared and regularly mowed. The pond will have a sinuous shoreline, resembling a natural pond. The shoreline and near-shore area of the water feature/stormwater pond will be planted with native aquatic and transitional species for both aesthetic and functional reasons. Species anticipated to be used in this location include wax myrtle (*Myrica cerifera*), cordgrass (*Spartina patens*), sand cordgrass (*Spartina bakerii*), sea oxeye daisy (*Borrchia sp.*), sawgrass (*Cladium jamaicense*) and similar species. The pond and wetlands vegetated area comprises approximately 1 acre or 18% of the project site. The pond landscaping will be accomplished immediately following completion of the stormwater pond.

In addition to being potential habitat and an aesthetic amenity, the pond will treat stormwater from the project site as well as providing offline treatment for stormwater from an 83-acre watershed, which is currently discharged to the Banana River with minimal treatment. Funding for this portion of the project has been obtained from FDEP and SJRWMD.

c. Invasive Exotic Plants

Initial restoration efforts on the project site will focus on removal or control of exotic or invasive species as identified in the Exotic Pest Plant Control Council’s publication *List of Florida’s Most Invasive Species*, found in Exhibit D of this management plan. Noting that Australian pine (*Casuarina sp.*) and Brazilian pepper (*Schinus terebenthifolius*) constitute the bulk of the exotic species present, the primary focus of this effort will be the removal and control of these species. Brazilian pepper on the project site will be removed as soon as possible while removal of Australian pine will be accomplished in phases. Other species such as air potato (*Dioscorea bulbifera*), carrotwood (*Cupania anacardioides*) and sansevieria (*Sansevieria Hyacinthoides*) will be eradicated within target work areas and reinfestation will be monitored as part of the invasive plant removal effort.

Exotic removal/control efforts will be coordinated and overseen by the City of Cocoa Beach. City staff, volunteer, and commercial resources will be used to conduct removal/control projects. Grants and other funding assistance will be sought to fund City, volunteer, or commercial removal and control projects. Potential sources of volunteer labor include organizations such as Marine Resources Council, Keep Brevard Beautiful, scout troops and similar groups.

Oversight of exotic removal/control projects will include ensuring that staff, volunteers or contractors are adequately trained and competent in the removal or treatment of exotic species within sensitive environments. The removal or treatment of exotic species shall have minimal or no impact on the natural resources on the project site.

Brazilian pepper and Australian pine will be eradicated by stump cut and immediate herbicide application. All cut trees will be chipped on site and the mulch stockpiled for use under trees or as path preparation. Cut peppers and pines will immediately be carefully painted with concentrated Garlon 4 herbicide. All effort will be made to perform removal activities when peppers are not flowering or seeding. When flowering or seeding is evident, chipped pepper will be stockpiled and monitored for seedlings. All seedlings shall be treated by spraying with garlon and continued monitoring.

Invasive plant removal activities have already commenced on the project site. The City of Cocoa Beach is holding a Pepper Bust at the project site once a month and will continue to do so until all invasives and undesirable plants are removed. It is anticipated that fifteen years will be needed to phase out all of the Australian pine on the property and to transition these affected areas into a functional hammock community. The first phase will include removal of invasive plants except for large Australian pines, which will be left in place until these newly planted trees have become established. The large Australian pines will be left along SR A1A to act as a buffer between the quiet hammock setting and the busy roadway. Large Australian pines will be left in other areas as noted in Table XI.a. The large Australian pines will be gradually removed over a fifteen-year period as the native trees grow to maturity. This first phase will also include the planting of native trees and shrubs. Once portions of the site are cleared of these invasive or nuisance species, part of the ongoing maintenance activities at the project site will be monitoring and treatment as needed to ensure that these species and other exotic or undesirable plants do not re-establish within the project site.

d. Feral Animal Program

While feral animals have not been observed on the project site and no evidence has been found of impacts to resources, habitat or wildlife by feral animals, the project site is located in the middle of a developed area. As a result, there is potential for the presence of feral cats. Should annual monitoring or periodic site visits indicate that feral animals are present or that impacts from feral animals are occurring, assistance will be sought from Brevard County Animal Control to remove these feral animals from the project site area.

VI. ARCHEOLOGICAL, CULTURAL AND HISTORICAL RESOURCE PROTECTION

To date, no archaeological or historic resources have been identified on the project site; however, there are identified archaeological sites nearby. The location of the site near the Atlantic Ocean and the Banana River may increase the potential for the presence of archaeological resources.

Although the project site was cleared in the past and regularly mowed, some artifacts may remain onsite.

Prior to any construction on the project site, the City of Cocoa Beach will contract with a professional archaeological surveyor to determine the presence of any archaeological, cultural or historic resources on the project site.

In the event that archaeological or historic resources are discovered at the project site, the Department of State, Division of Historical Resources, Bureau of Historic Preservation will recommend further action to protect these resources. The collection of artifacts or the disturbance of archaeological and/or historic sites will be prohibited unless prior authorization has been obtained from the Department of State, Division of Historical Resources. The management of archaeological and historic resources will comply with the requirements of Chapter 267, Florida Statutes, specifically Sections 267.061 (2) (a) and (b).

VII. EDUCATION SIGNS AND PROGRAMS

No educational programs, museum or nature center will be included as part of the site improvements.

Educational environmental signage will be provided at various locations throughout the project site. A large site map and environmental kiosk will greet visitors at the entrance to the preserve at the parking area adjacent to the Cocoa Isles Boulevard entrance. Another set of environmental kiosks will be incorporated into the wildlife observation deck on the stormwater pond. This signage will offer stormwater management information and its relationship to the Indian River Lagoon and the Maritime Hammock Preserve. Additional educational signage will be placed along the nature and exercise trails for maritime hammock species identification and function.

VIII. COORDINATED MANAGEMENT

The Maritime Hammock Preserve is adjacent to a small City-owned playground on Cocoa Isles Boulevard. This small neighborhood park provides an area for active play, preserving the project site for quieter, less active recreation. This playground sits directly west of the Cocoa Isles Boulevard entrance and with its lush oak shade trees provides an attractive gateway to the project site.

There is no need for coordinated management between properties since they are both owned and managed by the City of Cocoa Beach.

IX. MANAGEMENT NEEDS

a. Maintenance

Maintenance of the project site will be the responsibility of the City of Cocoa Beach under the direction of the City Commission and City Manager. The City's Public Works department will be responsible for the day-to-day services such as trash pickup and mowing. Long-term maintenance activities, such as trail maintenance, invasive plant monitoring and removal, and native plant and habitat enhancement will be accomplished by City staff, contractors, prisoner labor or volunteer efforts will accomplish removal and native plant and habitat enhancement.

Maintenance to improvements such as the wildlife observation deck, picnic tables and signage will be the responsibility of the City's Public Works department. The City's Stormwater Utility will be responsible for the short-term and rehabilitative maintenance associated with the stormwater pond.

b. Security

Similar to other public properties in the City, site surveillance and security will be provided by the City of Cocoa Beach staff, the City's Police Department and nearby Neighborhood Watch programs. It is anticipated that the project site will be closed between sunset and sunrise, like other City parks. The Police Department will include the project site on regular patrols and respond to calls for service. Signage at the preserve entrance will include the hours of operation. The Cocoa Isles Boulevard entrance will include a security gate, which will prohibit parking after the park closes.

c. Staffing

No new permanent staff will be needed to operate or maintain the project site. Maintenance will be provided or coordinated by existing Public Works staff. Security will be provided by existing Police Department staff.

d. Oversight and Stewardship

A committee to oversee the development and long-term management of this preserve and to promote stewardship by residents and users will be appointed by the City Commission.

X. COST ESTIMATES AND FUNDING SOURCES

Cost estimate detail for improvements, along with funding source is found on Table X.a.

XI. PRIORITY SCHEDULE

Improvements to the site will be implemented in three phases. The first phase will include removal of invasive plants - except for large Australian pines (> 4" dbh), which will be left in place. Throughout this phase, there will be active planting of large trees and shrubs. The first phase will also include the design and engineering of the stormwater pond, which should take approximately eighteen months. The pond construction should take approximately six months. The second phase will include most of the physical improvements including the wildlife observation deck, restrooms, educational kiosks, nature and exercise trails, picnic tables, landscaping and parking area. Additional habitat restoration will occur in this second phase with continued planting of oak, redbay and hammock tree species, understory shrubs and small open areas of native grasses and wildflowers. The last phase includes complete removal of the Australian pines and an enhancement of the restoration improvements including understory maritime hammock vegetation. The project will most likely continue for ten to fifteen years as the hammock species become large enough to warrant the complete removal of the Australian pine stands. A detailed schedule, showing the phases can be found in Table XI.a.

XII. MONITORING AND REPORTING

The City of Cocoa Beach will conduct or coordinate biological monitoring of the project site. Monitoring will occur twice annually; once during the spring/summer seasons and once during the fall/winter seasons. These visits will include a survey of the project site for the presence of listed plant or animal species, invasive or undesirable plant species, feral animals, or evidence of inappropriate human use of the project site. These visits will also assess the general overall condition of the project site as well as the condition and extent of the natural communities located on the project site. Monitoring will include an assessment of progress in restoration of these communities. Additional periodic inspections of the project site, especially to monitor for the presence of invasive or undesirable plants or feral animals, are also anticipated to occur. Should a listed species be identified and confirmed as present on the project site, this occurrence will be reported to the Florida Natural Areas Inventory. The Florida Natural Areas Inventory for plant and animal species can be found in Exhibit C of this management plan. Any revision to this Management Plan must be reviewed and approved by Florida Communities Trust.

The City of Cocoa Beach will prepare and forward to the Florida Communities Trust prior to the anniversary date of project plan approval an Annual Report evaluating implementation of the management plan. The report will include an evaluation of the degree of success in implementing the management plan. This Annual Stewardship Report will be due on January 30 of each year.